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MX: MILESTONE II. AIR MOBILE DRAFT SUPPLEMENT TO FINAL ENVIRONM--ETC(U)

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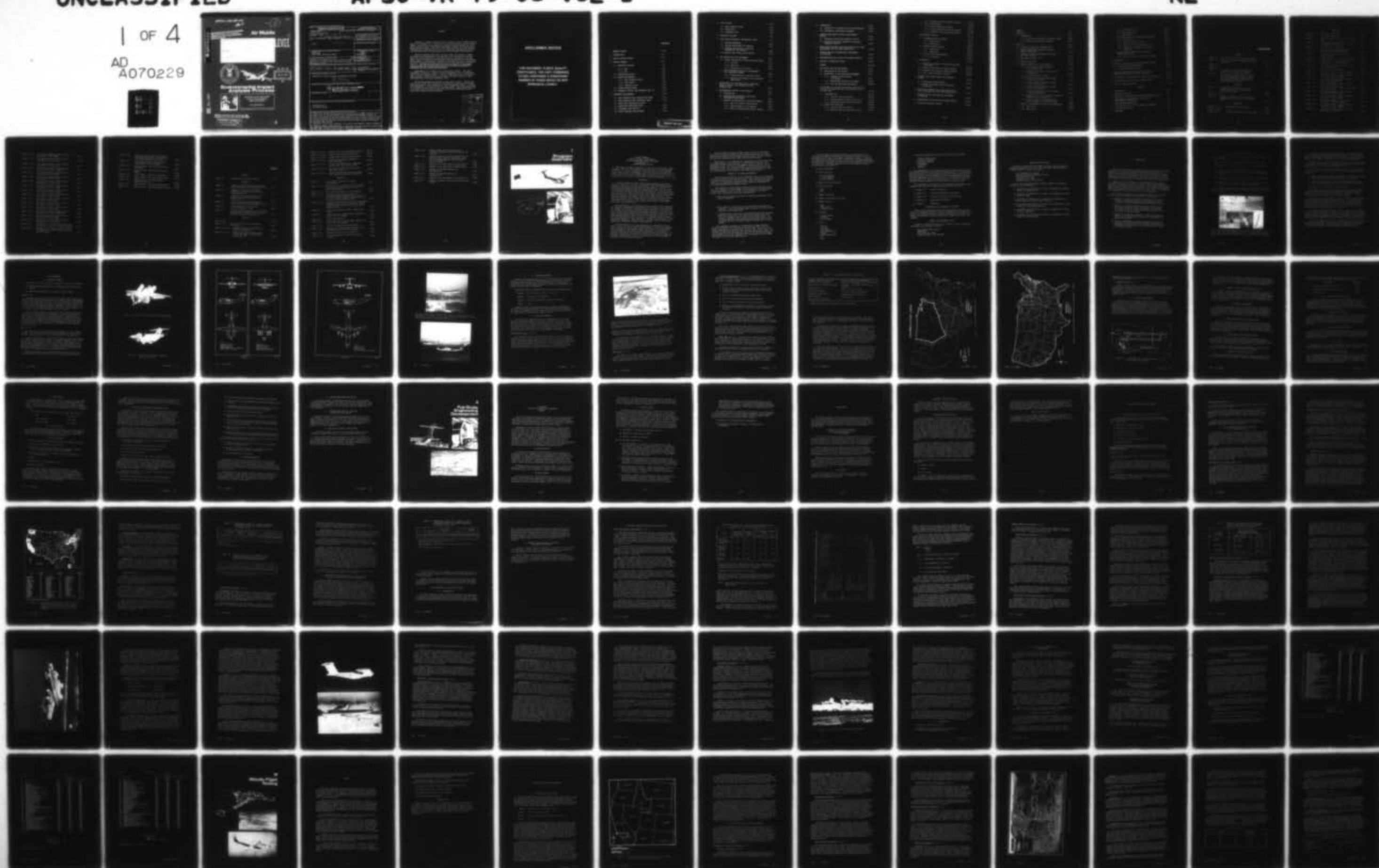

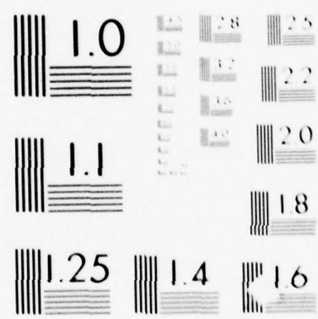

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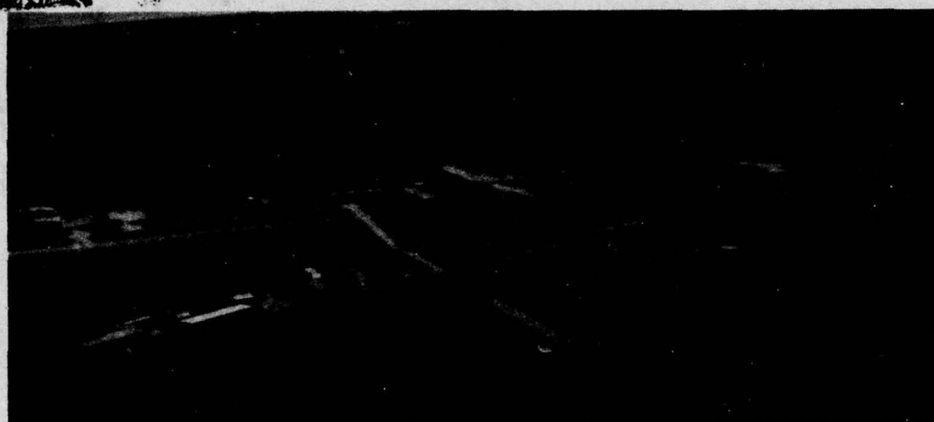

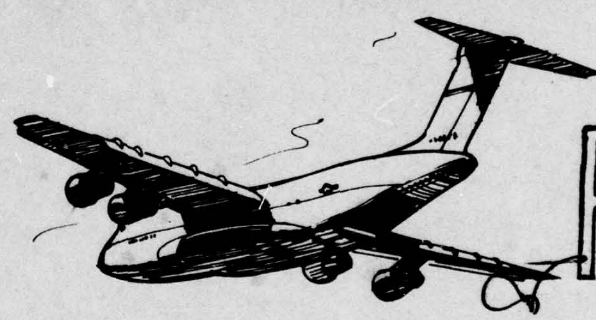

Environmental Impact Analysis Process

AIR MOBILE DRAFT SUPPLEMENT
TO FINAL ENVIRONMENTAL
IMPACT STATEMENT

MX: MILESTONE II

DEPARTMENT OF THE AIR FORCE

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1. Following a Defense System Acquisition Review Council (DSARC) meeting held on 5 December 1978 to consider MX Full-Scale Engineering Development (FSED), the Air Force was directed to perform further analyses of an air mobile basing concept. This Draft Supplement provides the environmental analyses of that concept as part of the comparison with Multiple Protective Structure (MPS) concepts presented at the December DSARC meeting.
2. Volume II is the final supplement to the Final Environmental Impact Statement. Its accession number is AD-A070 239.

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PREFACE

Following a Defense System Acquisition Review Council (DSARC) meeting held on 5 December 1978 to consider MX Full-Scale Engineering Development (FSED), the Air Force was directed to perform further analyses of an air mobile basing concept. This Draft Supplement provides the environmental analyses of that concept as part of the comparison with Multiple Protective Structure (MPS) concepts presented at the December DSARC meeting.

When the program enters FSED, the Air Force will develop a system which meets the requirements at acceptable cost and schedule; perform sufficient flight testing so that the system can proceed into the next phase, namely, production and deployment with minimal risks; and evaluate and analyze the environmental concerns and develop appropriate mitigative measures. The FSED decision does not include selection of deployment areas or bases for the operational missile, nor does it provide for production of final operational equipment.

Development of a concept is an evolutionary process. The Draft Supplement is based on a range of system parameters which is representative of the air mobile concept. The Final Supplement will be refined in light of public comments and the continuing Air Force efforts to meet requirements at the lowest acceptable cost.

The MX FSED program is planned to take about 5 years. During this time the Air Force will conduct an environmental program which includes the preparation of two Environmental Impact Statements (EISs) in addition to the Milestone II Final EIS and this supplement. These additional EISs will reflect progress made during FSED and provide additional opportunities for public review and comment.

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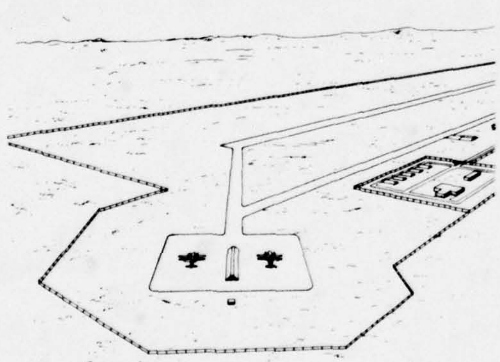
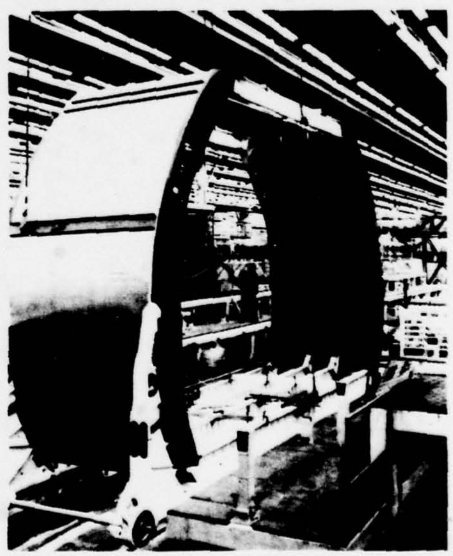
Program Overview





GENERAL SUMMARY
DRAFT AIR MOBILE SUPPLEMENT TO
FINAL ENVIRONMENTAL IMPACT STATEMENT
MX:MILESTONE II
(ADMINISTRATIVE ACTION)

This Draft Air Mobile Supplement to the Final Environmental Impact Statement (FEIS) for MX:Milestone II was prepared by the United States Air Force. In order to expedite Air Force response to your comments, please forward them to SAMSO/MNND, Norton AFB, California 92409, and provide a copy to the Deputy for Environment and Safety, Office of the Secretary of the Air Force, Room 4C885, Pentagon, Washington, D.C., 20330.

BACKGROUND

The United States Air Force has previously prepared and issued Draft (10 July 1978) and Final (30 September 1978) Environmental Impact Statements addressing the environmental consequences of Full-Scale Engineering Development (FSED) and the Basing Mode Decision for a new Intercontinental Ballistic Missile (ICBM) known as MX. The MX system is to be more survivable than present ICBM systems. Achievement of this survivability will require both a new, more capable missile, and deployment in a different way than is used for the existing missile force. Currently, missiles are emplaced in buried concrete structures (silos), with one missile in each. These missiles are becoming increasingly vulnerable with increases in the numbers and accuracy of the weapons that can be used against them.

The MX:Milestone II Environmental Impact Statement (EIS) addressed the potential environmental consequences of development and procurement of a number of full-scale prototype missiles and missile carriers, and of a series of tests associated with these prototypes. This action is known as Full-Scale Engineering Development, and the decision to proceed with this development phase is known as the Milestone II decision. The FSED decision does not include selection of deployment areas or bases for the operational missile, nor does it provide for production of final operational equipment. Those decisions, if made, require appropriate additional environmental studies and statements.

The MX:Milestone II EIS also addressed the comparative environmental effects of four survivable basing modes for the missile systems, and of variants on those modes. These were known as buried trenches, vertical shelters, horizontal shelters, and pools; all provided for ground transportation of the missiles among protective structures. At any time, a given missile would be in only one of a moderate number of possible structures, so that all of them would have to be targeted to be certain of destroying the missile.

The Basing Mode Evaluation Volume (Volume IV) of the Final EIS very briefly included as possible alternative concepts two air mobile options which under previous studies had been found to be less suitable than the four candidate basing modes for MX mentioned above.

Subsequently, it was decided that consideration should be given to air mobile options at the Milestone II decision point for MX. This Supplement provides additional environmental data and analysis of the air mobile option. The Final Supplement, in conjunction with the MX: Milestone II FEIS, will provide the environmental information necessary for consideration of this broader choice among basing options.

SUMMARY OF AIR MOBILE ALTERNATIVE

The alternative addressed in this Supplement is use of air mobility to provide a survivable basing mode for MX. This option and the Multiple Protective Structure (MPS) options formerly known as Multiple Aimpoint (MAP) will be considered at Milestone II as potential candidates for Full-Scale Engineering Development (FSED).

The elements of the air mobile alternative as now envisioned consist of a transport aircraft capable of air launching a missile similar to those described in the Final EIS, and a structure of air bases. Three levels of facilities are under consideration:

- Main operating bases from which the aircraft and missile force would be supported

- Alert bases, at which two or more aircraft with missiles are stationed. Crews and minimum support personnel would be rotated from the main operating bases.

- Dispersal sites, where alert base aircraft could land and among which they could move in the extremely unlikely event of an actual or imminent missile attack on the United States. The Air Force intends to use existing military bases and civilian airfields and other available expedient landing sites for this purpose.

This Supplement represents an examination of those potential impacts associated with a decision to proceed with FSED of the air mobile alternative, as they are known at this time. Some issues have necessarily remained unresolved, and have been identified as such. The relative potential for environmental impact of the MPS and air mobile basing modes has also been addressed, for consideration of environmental effects in the basing mode decision.

The large number of variables inherent in the selection of a particular air mobile basline concept of operation result in a correspondingly wide range of attendant environmental impacts. Although this Supplement represents the best estimate for this anticipated range of impacts, specific impacts depend on the values assigned to the respective variables. Variables which affect this environmental analysis include but are not limited to:

- Threat assessment
- Size of missile
  - 69 inch diameter
  - 83 inch diameter
  - 92 inch diameter
- Number of RVs per missile
- Type of aircraft
  - AMST
  - WBJ
- Number of aircraft
- Number of missiles per aircraft
- Number of bases
  - MOBs
  - Alert bases
  - Dispersal sites
- Personnel
  - Support (MOBs)
  - Aircrews
  - Alert support
- Costs
  - Missile
  - Aircraft
  - Consumables
  - Base construction
  - Support
  - Navigational aids
  - C3
  - Test

- Resource consumption (water, POL, electricity, materials)

    - Facility construction
    - Missile production
    - Aircraft production
    - Deployment
    - Operations
    - Support

This Supplement to the MX:Milestone II Final EIS was filed with the EPA and made available to the public in February 1979. The public comment period will be only 25 days and cannot be extended. This procedure has been agreed to by the President's Council on Environmental Quality. The Final Supplement to the Final EIS will be filled with the EPA about two weeks after the close of the comment period. It will contain the substantive public comments and the Air Force's response to them.

This supplement is organized into the following five chapters that supplement the respective volumes of the MX:Milestone II FEIS:

- Chapter I: Project Description
- Chapter II: Full-Scale Engineering Development
- Chapter III: Aircraft and Missile Flight Testing
- Chapter IV: Basing Mode Evaluation
- Chapter V: Appendices

DISTRIBUTION OF SUPPLEMENT FOR COMMENT

Copies of this Supplement have been provided for review and comment to the addresses listed in Chapter V, Appendix E. Reference copies of both this Supplement and the six volume MX:Milestone II Final EIS (FEIS) are available for public review at the libraries listed in this appendix.

REQUEST FOR SUPPLEMENT COPIES

Persons or organizations who wish to obtain a copy of this Supplement may do so by writing or calling:

Civil Engineering Division
SAMSO/MNND
Norton AFB, CA 92409
Telephone Number (714) 382-6891

REQUEST FOR FEIS COPIES

Persons or organizations who wish to obtain a copy of the six volume MX:Milestone II Final EIS (FEIS) may order these documents for a nominal charge by writing or calling:

U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22151
Telephone number (703) 557-4600

Use of the following DDC/NTIS Accession numbers will expedite acquisition of the documents:

- AD A063491, HQ AFSC-TR-79-01, Volume I; MX:Milestone II FEIS, Volume I Program Overview
- AD A063492, HQ AFSC-TR-79-01, Volume II; MX:Milestone II FEIS, Volume II, FSED
- AD A063493, HQ AFSC-TR-70-01, Volume III; MX:Milestone II, FEIS, Volume III, Missile Flight Testing
- AD AO 63494, HQ AFSC-TR-70-01, Volume IV; MX:Milestone II FEIS, Volume IV, Basing Mode Evaluation
- AD AO63495, HQ AFSC-TR-79-01, Volume V; MX:Milestone II FEIS, Volume V, Appendices
- AD A063496, HQ AFSC-TR-79-01, Volume VI; MX:Milestone II FEIS, Volume VI, Public Comments

1. INTRODUCTION

This chapter describes the concept of operations for the air mobile ICBM option, the various system elements that are required if it is developed and placed into operation, and associated personnel requirements, costs, and resources required (Sections 2 through 6). Section 7 describes the actions that would be taken if a decision to enter Full-Scale Engineering Development of the air mobile option were implemented.

Volume I of the MX:Milestone II FEIS addressed the need for a survivable ICBM system, the manner in which major defense systems are acquired, environmental analysis methodology, Environmental Impact Statements presently identified for the program, special monitoring programs, and key environmental issues and effects for MPS systems. This material has consequently not been duplicated for this Supplement.

The remaining chapters of this supplement address the following issues or contain supplementary information as appropriate:

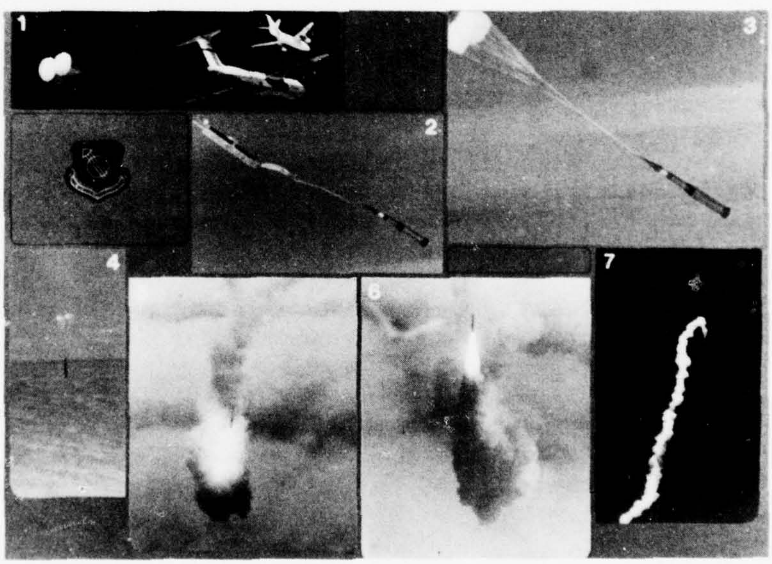
- Chapter II, Full-Scale Engineering Development, treats the potential environmental impacts of the FSED phase of the air mobile option, excepting aircraft and missile testing.
- Chapter III, Aircraft and Missile Flight Testing, treats the potential impact of these activities, which are more site specific than the overall FSED impacts, though forming a part of the FSED program.
- Chapter IV, Basing Mode Evaluation, compares the potential impacts of air mobile and MPS basing, for consideration in basing mode selection.
- Chapter V, Appendices, provides supplementary information required for completeness of the document, but placed here to minimize the bulk and facilitate reading of the individual technical volumes.

2. THE AIR MOBILE CONCEPT

The Air Mobile ICBM concept as presently conceived consists of the following elements:

- Aircraft capable of transporting and airlaunching ICBM
- Missiles similar to those described in the MX:Milestone II FEIS
- A structure of air bases and landing sites to support the system, and provide for survivable operation during wartime operations
- Ground beacons to provide position and velocity information to the aircraft and the missile guidance systems
- Command, Control, and Communications (C3) systems required for positive, reliable, and responsive operation

Survivability against surprise attack is provided by basing the aircraft in such a way that they have sufficient time to escape if an attack is sensed.



The air launching of an ICBM was successfully accomplished using a C-5 aircraft and a modified Minuteman missile on 24 October 1974. Additional investigation has focused on ensuring survivability at minimum cost.

Survivability against an anticipated attack, or extended survival after an attack, is provided through random movement of the aircraft among a large number of dispersal sites. An aircraft landing at such a site moves to another site before it can be detected and attacked.

Aircraft carrying fully operational missiles would fly only when an actual attack had occurred, or was judged to be imminent. This is the present practice with the strategic bomber force.

Three classes of operational locations are visualized under this concept, only two of which are involved directly in routine peacetime operations:

- Main operating bases (MOBs) for support of a number of assigned personnel and their associated equipment and personnel

- Alert bases, with alert aircraft and supporting facilities, sited to provide adequate escape time from a surprise attack

- Dispersal sites, throughout the United States

Alert bases are visualized as being "austere," with the minimum necessary facilities, and with few permanently assigned personnel. Personnel would be cycled weekly from the associated MOB. Dispersal sites would not be staffed for the air mobile concept.

Existing military bases would be used for the main operating bases and alert bases to the maximum feasible extent. Co-use of civilian airfields for alert bases will also be considered. Dispersal sites would include existing airfields of all types with various levels of support facilities, or other locations (e.g., dry lake beds with no facilities) that could be adapted to the purpose.

To achieve the desired degree of missile accuracy, a Ground Beacon System (GBS) would be used to provide positional updates to the missile guidance system. The Global Positioning System (GPS), which will provide satellite data worldwide, will also be available. Both the GBS and the GPS would be available for use by commercial and general aviation.

A positive command, control, and communications (C3) system will be required to assure that the status of all system elements can be monitored, that the missiles can be retargeted on command, and that the missiles can be launched only when authorized by the President.

3. SYSTEM ELEMENTS

3.1 CANDIDATE AIRCRAFT

Two types of aircraft are being considered for air mobile ICBM use:

- Modified Advanced Medium Short Takeoff and Landing Transports (AMSTs)

- Modified "Wide-Bodied Jet" transport aircraft (WBJs)

AMST (3.1.1)

Two AMST-type aircraft with short-field takeoff and landing (STOL) features have been developed through the prototype stage. A two-engined version, designated the YC-14 (Figure 3-1), was developed by the Boeing Company, and a four-engined version, designated the YC-15 (Figure 3-2), was developed by the McDonnell Douglas Corporation. Derivatives of the YC-14 and YC-15 are under consideration for the air mobile concept. It is proposed that the AMST derivative carry one missile.

Use of an AMST derivative which retains STOL features would permit operations at a large number of dispersal sites without the need to make physical improvements at the dispersal sites. Compared with aircraft capable of carrying more than one missile (Section 3.1.2) more aircraft would be required with the potential need for more alert bases. The number of AMST derivatives will be established in FSED. For the purpose of this air mobile Supplement, an estimated 300-350 AMST type aircraft was used.

WBJ (3.1.2)

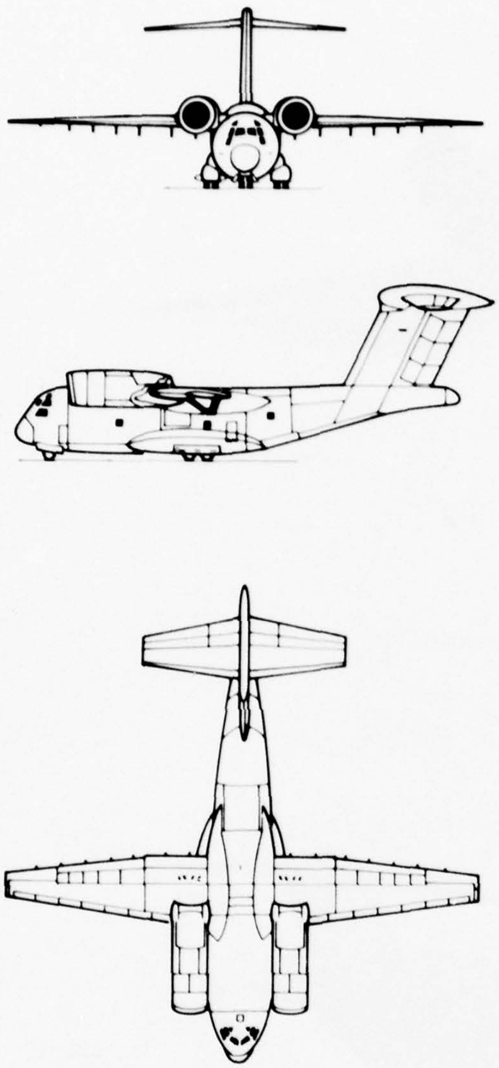
Two existing WBJ aircraft are being considered for the air mobile concept. These are the Lockheed C-5 and the Boeing 747. Both of these aircraft could be modified to carry and launch one or more missiles.

Use of a wide-bodied jet, which does not have the same STOL features as the AMST, would reduce the number of available dispersal sites. WBJs require an increased runway length for operations compared with STOL type aircraft. Compared with aircraft which carry one missile, as proposed for the AMST derivative, less aircraft would be required with the potential for fewer alert bases. An estimated 150-175 WBJ-type aircraft was used for the purpose of the environmental analysis.

Figures 3-3 and 3-4, when compared present the relative sizes of the existing AMST and WBJ aircraft and their respective characteristics.

Figure 3-1. The YC-14, developed by The Boeing Company.

Figure 3-2. The YC-15, developed by McDonnell Douglas Corporation.



YC–14

LENGTH: 131 FT, 8 IN.
WINGSPAN: 129 FT, 0 IN.
HEIGHT: 48 FT, 4 IN.
GROSS T/O WEIGHT (STOL): 170,000 LBS
CAPACITY (STOL): 27,000 LBS

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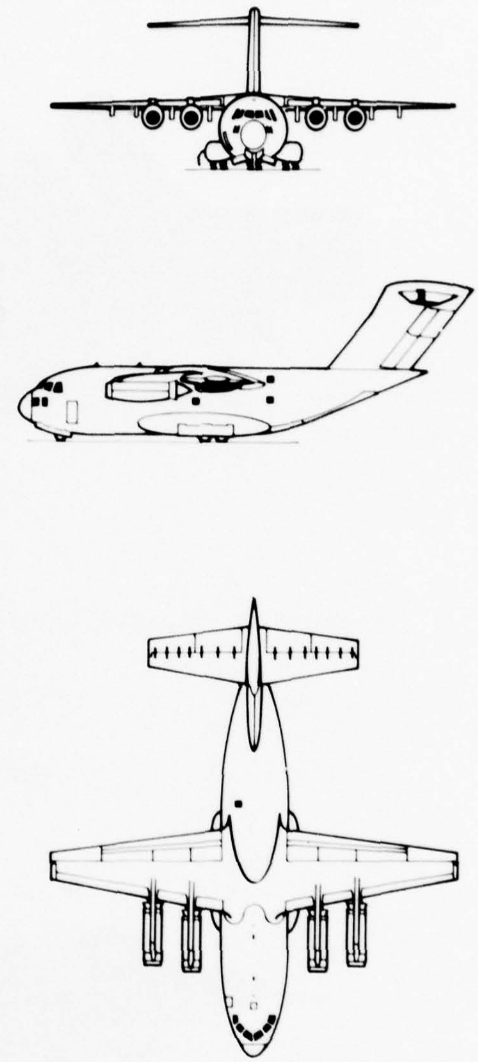

YC–15

LENGTH: 124 FT
WINGSPAN: 110 FT 4 IN.
HEIGHT: 43 FT 4 IN.
GROSS T/O WEIGHT (STOL): TBD
CAPACITY (STOL): 27,000 LBS

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Figure 3-3.

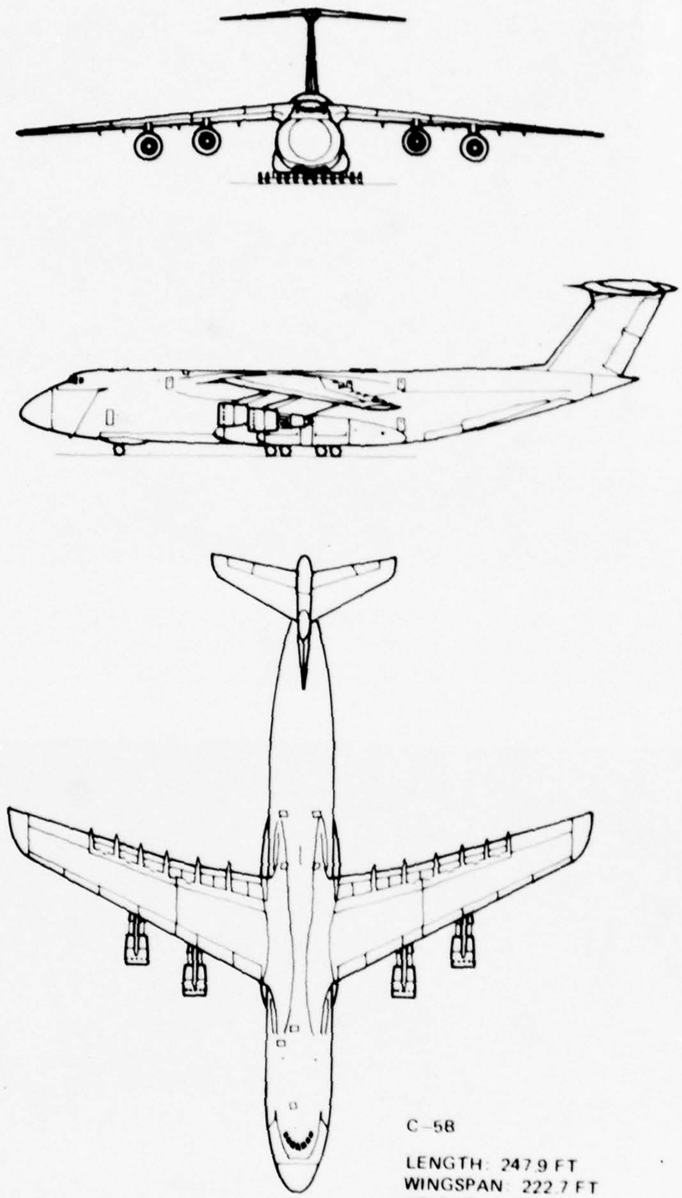

Figure 3-4.

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The WBJ aircraft under consideration include derivatives of the 747 above and the C-5 below. A C-5, shown here being refueled by a KC-135, successfully launched a modified ICBM in 1974.

3.2 CANDIDATE MISSILES

Missiles under consideration for the air launch mode are generally similar to those described in the MX:Milestone II FEIS. All use solid propellant rocket motors, and a post-boost vehicle, a guidance and control system, and a deployment module for mounting and dispensing the reentry vehicles (RVs), or warheads.

The missiles under consideration vary within the following ranges:

Diameter:	69, 83, 92 inch (175, 210, 235 cm)
Length:	50 to 60 ft (15 to 18m)
Weight:	60,000 to 160,000 lb (27,000 to 72,600 kg)
Stages:	2 or 3

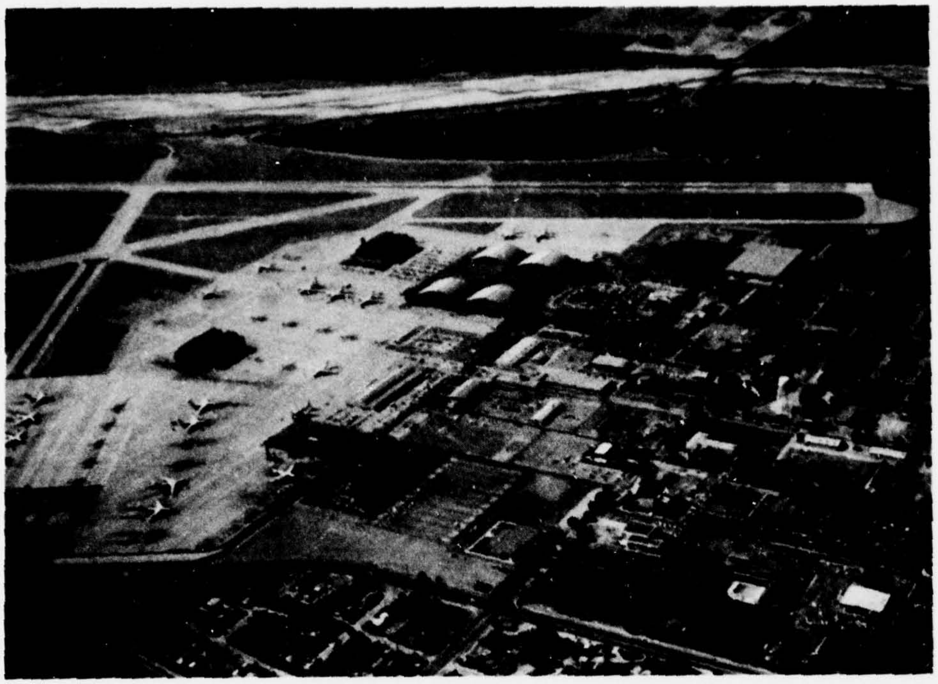
Elements of the 83 inch diameter missiles would be common with those of a new missile for use in U.S. Navy Trident missile submarines. The degree of "commonality" would range from one or two booster stages, to "fully common," including the guidance system.

3.3 BASING REQUIREMENTS

Three levels of operation have been identified for the system: main operating bases (MOBs), alert bases, and dispersal sites. All MOBs are expected to be existing Air Force bases. As many alert bases as practical will be located at deactivated military bases, co-located with existing military bases, or if feasible co-located with civilian airfields. New construction is to be minimized. Dispersal sites may use any appropriate surface that is adaptable to the purpose.

Main Operation Bases (3.3.1)

Main operating bases would be existing Air Force bases, located to support aircraft at their associated alert bases. From 5 to 8 MOBs will likely be required, depending on the type of aircraft selected and the final scale of deployment. MOBs need not be located within the "survival area" required for alert bases (Section 3.3.2.1), but must be close enough to these bases for efficient operation. The MOBs are expected to provide facilities for support of both missiles and aircraft.



Main Operating Bases will provide aircraft, missile, and personnel support. The base would have maintenance and related facilities similar to the base pictured here which has two squadrons of C-141 aircraft, approximately the same external size as the AMST aircraft.

Some may provide aircraft support functions only. All MOBs will require facilities for command and administration, and for personnel support (including the personnel on rotational duty to alert bases).

The additional area required for these facilities depends on functional requirements for the MOB and the specific existing base selected. For planning purposes, a nominal 1,900 acres (750 ha) has been used. Final designs will be unique to each base because the extent of construction required will depend on the type and number of aircraft and missiles, and the availability, adaptability, and condition of the existing base facilities.

Alert Bases (3.3.2)

The alert bases provide limited support of two or more aircraft in a ready posture. The actual number of bases will be established during FSED. Alert personnel would rotate from associated MOBs every seven days, and most support for the alert base would come from the MOBs.

Location Requirements (3.3.2.1). Alert bases would be located to provide for survival, public safety, and minimum impact on cultural resources. Criteria currently considered applicable are listed below; they will be refined in FSED.

- Approximately 700 nm (1,300 km) from coastal waters

- Excluded areas: national parks, monuments; Indian reservations; existing ICBM installations; areas over 5,000 ft (1,500 m) altitude

- 60 nm (110 km) minimum distance between bases

- 18 nm (35 km) from cities over 25,000 population

- 3 nm (5.5 km) from cities 5,000-25,000 population

- Distances from inhabitated buildings traveled public highways and passenger railroads as required by explosives safety criteria

To ensure survival from a submarine-launched ballistic missile (SLBM) attack, a standoff distance of approximately 700 nm (1,300 km) from coastal waters is desirable to allow adequate warning time for aircraft to safely escape from their alert bases. Dependent on economic considerations, threat analyses, and availability of suitable existing airfields, the primary study area may be enlarged as indicated by Figure 3.3.

The siting criteria define broad areas within which alert bases could be sited. No specific sites have been selected at this time, and final siting would require further studies based on technical and environmental criteria. These studies will be performed if the air mobile system proceeds into FSED.

Facilities (3.3.2.2). Facilities are expected to be provided at each alert base for two or more aircraft. For survivability, the number of aircraft at an alert base would likely be higher in regions remote from coastal waters than in regions closer to the coast. (This consideration will be addressed in more detail during FSED).

Conceptual facilities for an alert base are listed in Table 3-1. FSED would include studies to minimize the facilities required.

Most personnel at an alert base would be rotated from the MOB on a seven day cycle, requiring transient dormitory and messing facilities on base, but no family housing or extensive support facilities. The possibility of using local civilians for some functions to reduce operating costs will also be studied in FSED, Figure 3-4 shows a

Table 3-1. Conceptual alert base facilities.

Runways, Taxiways, Aircraft Bunkers (1,2,3 runways[1])	Heated Storage for Snow Removal, Maintenance Equipment (where necessary)
Alert Facility (Aircrew Housing)	Assembly, Surveillance and Inspection Building
Command Post	Reentry vehicle storage
Security Operations	Intrusion Detection Equipment
Dormitory and Messing	Underground Fuel Supplies
Fire Station	Control Tower
Tactical Air Navigation	

[1]Taxiways could serve as runways in alert situations.

conceptual alert base for four aircraft, using a taxiway. The entire base area would be fenced. A double-fenced, high-security area would be provided for aircraft, nuclear weapons handling, security facilities, and personnel.

An alert base is expected to require approximately two mi2 (5 km2) of land, varying with the type and number of aircraft accommodated, and the final design features. Clear areas (no inhabited buildings) required by explosives safety regulations may extend a limited distance beyond base boundaries. A cleared zone of at least 30 ft (9 m) would be required around all fences, and the surrounding area must be in clear view for detection of intruders. A road would be required to the nearest public highway, and electrical power for normal operations would be provided from commercial sources. A handling facility will be required, as the reentry vehicles are not to be flown attached to the missile in peacetime.

The total number of alert bases is to be determined during Full-Scale Engineering Development. The type of aircraft, the type of missile, the number of reentry vehicles per missile, the number of missiles per aircraft, the cost of the system, and the projected threat are all items that will be major considerations in determining the number of alert bases. Current estimates involve 30 to 70 alert bases in the area shown in Figure 3-3. As noted previously, to the maximum extent practical, these will be existing airfields, preferably military airfields. The

AIR MOBILE STUDY AREAS

Figure 3-3. Primary and Expanded Study Areas.

Figure 3-5. Existing VOR/TACAN stations in the United States. 372P-1279-1

feasibility of operating the system with no alert bases may also be considered during FSED.

Dispersal Sites (3.3.3)

Several thousand dispersal sites throughout the continental United States would be required to establish location uncertainty and enhance survivability. Dispersal sites will include existing airstrips and other types of paved or unpaved surfaces, such as dry lake beds or highways. The exact number and types of dispersal sites will be established in FSED.

3.4 GROUND BEACON SYSTEM

A ground beacon system would provide positional and velocity information to the missile guidance system. For planning purposes, beacons would be spaced at approximately 60 nm (110 km, 69 statute miles) intervals, and wherever feasible would be co-located with the VOR/TACAN stations of the federal airways. Approximately 700 to 1,200 will be necessary. Where co-location is not possible, it may be necessary to install beacons at other than VOR/TACAN sites. This condition exists principally in the northwestern United States (see Figure 3-5).

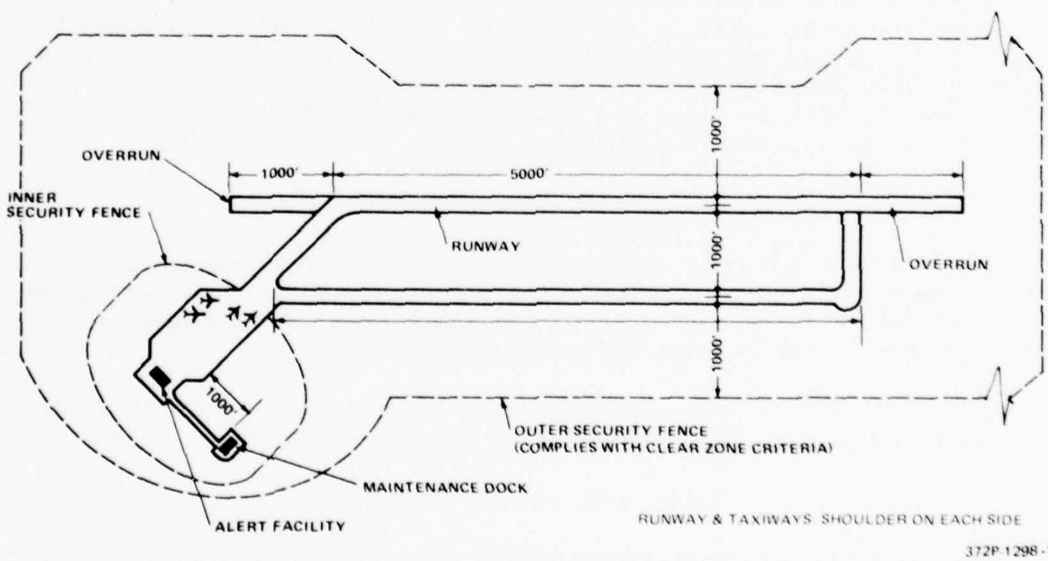


Figure 3.4. A conceptual four aircraft AMST alert facility with a runway and taxiway.

The beacons would be capable of unattended operation and would be monitored remotely to detect tampering or malfunctions. Beacons would require a few hundred square feet to, at most, a few thousand square feet (tenths of acres) each for installation. They would be available for civilian use.

3.5 COMMAND, CONTROL, AND COMMUNICATIONS (C3)

A command, control, and communications (C3) network is required for the system to provide rapid, continuous, and survivable command and control among SAC Command and Control Centers, National Military Command System elements, and the key elements of the system. Maximum use will be made of existing system elements. Details of the C3 system will be resolved during FSED.

4. PERSONNEL REQUIREMENTS

Personnel requirements will vary with the scale of deployment, the type of aircraft and missile selected, the final "mix" of alert base type and location selected, and other factors which will be examined in detail during FSED. "Best estimates" for a nominal system have consequently been used in the environmental analysis. These estimates are as follows.

4.1 MAIN OPERATING BASE CONSTRUCTION PHASE

Based on an estimated $150 million to $200 million (1977 dollars) for necessary construction at an existing USAF base over an assumed two year period, 650 to 900 construction workers will be required to expend 1,300 to 1,800 manyears of labor at each MOB. These estimates will be refined during FSED as sites are selected and specific existing facilities availability is assessed.

4.2 MAIN OPERATING BASE OPERATIONS PHASE

The MOB will not only require personnel to perform its unique functions, but will also provide primary housing and related facilities for personnel on rotational duty to the alert bases. The number of alert bases per MOB is expected to be in the range of 6 to 12.

A typical MOB is expected to require approximately 3,500 to 6,000 additional personnel, which includes rotational personnel.

4.3 ALERT BASE CONSTRUCTION PHASE

Construction personnel requirements for an alert base depend on the facilities that need to be supplied. Assuming a one-year construction

schedule with manyears equal to people and based on the cost estimates in Section 5.2, the following estimates have been developed:

FACILITY	MAN-YEARS
Co-use of existing military base	60-70
Co-use of existing civilian airfield	60-80
New alert base	150-170

4.4 ALERT BASE OPERATIONS PHASE

Typical alert base manning requirements are expected to lie in the general range from 90 to 120 personnel. All would be on seven-day rotational duty from the MOB. Hiring of local residents for base maintenance such as grounds keeping, snow removal, and minor administration will be explored in FSED to reduce overall manning requirements and provide local employment opportunities.

4.5 DISPERSAL SITE ACTIVITY

No facilities are planned to be constructed at existing airfields other than runway extensions/improvements, if required. Construction personnel requirements have not yet been determined; however, they are expected to be minimal. Dispersal sites are to be used only in the event of an actual or imminent attack. They will be unmanned during peacetime.

4.6 TOTAL PERSONNEL REQUIREMENTS

Total operational personnel requirements for the system are estimated to be 20,000 to 50,000 people including both civilians and military. Considerable effort is being expended to reduce this manning requirement and will continue during FSED if air mobile is selected for Full-Scale Engineering Development.

5. COST FACTORS

Total costs for production, deployment, and operation of the system are not available. The environmental implications are addressed in the unresolved issues section of Chapter IV.

5.1 MAIN OPERATING BASES

Main operating bases are currently assumed to be existing Air Force bases, expanded as necessary to provide air mobile ICBM support functions. Construction costs for a MOB are estimated at approximately $150 million to $200 million. Construction costs for personnel support and missile support depend on sites selected.

5.2 ALERT BASES

Alert bases as currently conceived will involve a minimum number of totally new bases. Reactivation or use of existing military, or co-use of civilian, airfields will be considered in order to minimize costs. The technical feasibility of co-use (which involves a range of factors including safety, security, and survivability) will be addressed in FSED.

Estimated costs per alert base are as follows (1977 dollars):

New	\$18 million
Co-use civilian	\$ 9 million
Co-use military	\$ 7 million

5.3 DISPERSAL SITES

No facilities are planned to be constructed at existing airfields other than runway extensions/improvements, if required. The number of dispersal sites requiring improvement, and the cost associated with these improvements will be determined during FSED.

6. RESOURCES REQUIRED

Resources required for system construction and operation include:

- Construction materials for facilities
- Materials required for production of other system elements (e.g., aircraft, missiles, electronic equipment)
- Dollars and manpower for production of system elements, and for system operation
- Water
- Petroleum, oil, and lubricants (POL)
- Electrical energy

The principal resources required for construction of ground facilities are labor, cement, asphalt, steel, water, and electrical power. The potential impacts of consumption of these resources have been addressed in Chapter IV. Other materials and equipment will also be required (e.g., wire, emergency power supplies, batteries); the requirements for such materials and equipment are not expected to result in potential impacts, and have not been analyzed.

A wide variety of materials are used in the fabrication of aircraft and ICBMs. The requirements for these resources are not expected to differ substantially from those for the MPS options, and are not addressed in this Supplement.

7. FULL-SCALE ENGINEERING DEVELOPMENT (FSED)

The preceding sections have described the air mobile ICBM system as it would be deployed if selected. This information bears on basing mode selection. Volume I, Section 2.3 of the MX:Milestone II FEIS describes the procurement cycle for major systems. Chapters II and III of this Supplement address the impacts of the FSED development and flight testing phases, respectively. Chapter IV of this Supplement addresses the basing mode environmental factors that have been considered in comparing the relative impacts of multiple protective structures (MPS) and air mobile survivable ICBM systems.

The Full-Scale Engineering Development decision point in a system acquisition program is referred to as Milestone II. At this milestone, the Defense Systems Acquisition Review Council (DSARC) is to reaffirm the need for the program and assess the cost and schedule limitations. The review results in recommendations to the Secretary of Defense. The following major issues will be considered in the Milestone II decision:

- Which of the alternative missiles should be used for a survivable ICBM force?
- Which basing mode concept should enter into FSED?
- A multiple protective structures alternative
- An air mobile alternative
- What are the technical, cost, and environmental risks?

The FSED phase for the air mobile ICBM alternative, if approved, would required approximately five years. Nationwide expenditures ranging from $5 billion to $7 billion were used for analysis in this Supplement and in the FEIS. While national expenditures do not differ significantly for air mobile or MPS FSED, regional impacts do differ and are addressed in Chapter II of this Supplement.

Proceeding into FSED of an air mobile system would require the following types of activities:

- Continuing systems-level studies and program management
- Missile development, prototype fabrication, and testing

- Aircraft modification, prototype fabrication, and testing

- Ground beacon system development, prototype fabrication, and testing

- Development, prototype fabrication, and testing of all associated C3 and other required electronics equipment

- Aircraft flight testing and qualification

- Missile flight testing, both on the ground and in the air launch mode

- Selection of the sites for MOBs, alert bases, and dispersal sites (a separate EIS would be prepared in connection with this site selection process)

- Design of the facilities required for MOBs, alert bases, and dispersal sites

- Gathering cost, technical, and environmental data for reaching a future production and deployment decision, Milestone II

Note that an implementation of the decision by the Secretary of Defense at Milestones II and III requires:

- Initial approval by the Executive branch of the government through the budget process

- Approval by Congress through the appropriations process (including appropriate hearings and debate)

- Final approval by the President

7.1 PROGRAM MANAGEMENT

Management of the Air Mobile FSED program will involve system program offices at Norton Air Force Base, California, and Wright-Patterson Air Force Base, Ohio. The program offices will let contracts for the design, fabrication, and test of the individual elements of the system; these system elements will be developed in facilities throughout the United States.

The potential economic impacts of the activities conducted by or under the direction of the SPO during FSED are addressed in Chapter II of this Supplement. Those specific activities for which potential environmental consequences have been addressed separately in this Supplement are outlined briefly below.

7.2 MISSILE DEVELOPMENT AND TESTING

A sufficient number of prototype missiles will be developed and tested during FSED to assure that they will meet the design goals. The environmental consequences of the design and prototype production phase are addressed in Chapter II, and of the test phase in Chapter III of this Supplement.

7.3 AIRCRAFT MODIFICATION, PROTOTYPE FABRICATION, AND TESTING

Prototype aircraft will be developed during FSED for use in the test program. Initial tests would be at the selected contractor's plant, followed by flight tests at the Air Force Flight Test Center at Edwards Air Force Base, California. Specialized tests would also be conducted at other Air Force facilities. Details are given in Chapter III of this Supplement.

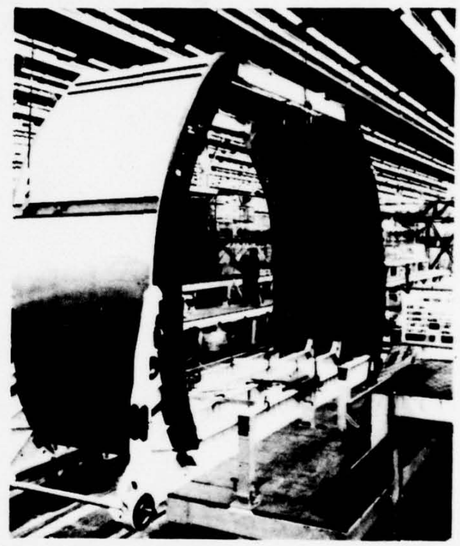
7.4 MISSILE AND SYSTEM FLIGHT TESTING

A sufficient number of tests of the prototype missile must be conducted to assure that they will meet their design objectives.

Both ground launches from Vandenberg Air Force Base (VAFB) and air launches from the prototype aircraft are planned. These tests will use instrumented missiles (no warheads), and will be conducted on the Western Test Range (WTR), which extends from VAFB to Kwajelein Atoll. Details are given in Chapter III of this Supplement.

II

Full-Scale Engineering Development



AIR MOBILE
FULL-SCALE ENGINEERING DEVELOPMENT
SUMMARY

Full-scale engineering development (FSED) of an air mobile system represents a refinement of existing aircraft and missile technology. This refinement of technology is not expected to cause new or otherwise significant environmental effects other than these expected on capital and labor resulting from any multi-million dollar project.

Management of the air mobile FSED Program will involve Program Offices at Norton Air Force Base, California and Wright-Patterson Air Force Base, Ohio. The program offices will let contracts for the design, fabrication, and test of individual elements of the systems; these system elements will be developed in facilities throughout the United States. Environmental consequences of full-scale engineering development of air mobile will generate effects at three levels: national, regional, and site specific. Site specific effects are primarily a function of testing and validation activities while national and regional effects are primarily a function of the investment of several billion dollars for development and manufacturing.

TEST SITE IMPACTS

Air mobile will include testing activities to be conducted at increasing levels of complexity as the program moves from design and development of individual components and assemblies to manufacture and integration of complete subsystems including the aircraft and missile themselves. Test objectives encompass subsystem compatibility, performance and reliability. Among these are aircraft and missile wind-tunnel, stress, flight and simulated nuclear effects and destruct tests.

Separate missile tests were analyzed in Volume II of the FEIS, and are not repeated in this supplement. Aircraft tests, separately and at the systems level, are the subject of Chapter III of this supplement.

NATIONAL IMPACTS

At the national level, the expenditure of money for aircraft and missiles and the resulting competition for national resources, is projected to occur over a five-year period. Volume II of the FEIS evaluated impacts resulting from FSED expenditures of $5.0 to $7.0 billion

(1977 dollars). Aircraft manufacturing investments are projected to occur over the first three to three and a half years of this period. Thus, at the national level, effects will remain essentially the same as those analyzed in Volume II of the FEIS.

REGIONAL IMPACTS

Full-Scale Engineering Development is estimated to cost between $5 and $7 billion with aircraft development costs in the range from $600 million to a billion dollars. These expenditures will induce employment adjustments in those regions with industrial specialization in aerospace in general, and aircraft in particular. In turn, population and demand for housing and requisite services will be affected. Aerospace industry employment is concentrated in about 20 states. Fewer states specialize in aircraft production. Three states are evaluated for estimating the potential impacts of air mobile aircraft manufacture expenditures. The three states and the study regions within them are:

- California — Los Angeles and Orange counties
- Washington — Seattle and environs
- Georgia — Atlanta and environs

Specific regional impacts are:

- Job opportunities. Increases in job opportunities, both directly working on the air mobile MX project, and indirectly as a result of economic stimulation will occur. Total jobs in any one region could range as high as approximately 9,000. However, combined with other MX investments in the Aerospace industry, this upper range could become 55,000. Exact numbers will depend on award of contract.

- Potential local population growth resulting from increased employment. Since employment in aircraft and support industries is heavily concentrated in large metropolitan areas, population in-migration is expected to be small except at a localized level.

- Water and energy resources. Current water supply constraints may hinder growth in specific areas including parts of Southern California. Electric power supply may be impacted in certain regions in Georgia.

- Air quality. Except for propulsion and engine system testing, most developmental activities themselves do not directly produce atmospheric pollutants. Engine systems will be developed at facilities which already possess the required

technological capabilities, and have conducted similar tests over the years. Indirectly, air quality degradation resulting from increased population, transportation, and energy consumption is expected to be minimal; effects would be observed only at a very localized level.

The air mobile option of deploying the MX missile is an alternative to the multiple protective structure (MPS) deployment concept discussed in the MX; Milestone II Final Environmental Impact Statement (FEIS). Alternatives within the air mobile option, include:

- Variation of aricraft/missile configurations
- Alternative development schedules, including delay or postponement.

INTRODUCTION

The overall objective of the Full-Scale Engineering Development of the air mobile program is to develop a basing mode for the MX ICBM missile that will meet defined mission needs at an acceptable cost. Full-scale engineering development includes construction of prototype systems and performance of sufficient testing to validate the achievement of program goals.

ELEMENTS OF FULL-SCALE ENGINEERING DEVELOPMENT WHICH MAY AFFECT THE ENVIRONMENT

This section primarily focuses on design and production of prototype aircraft and missiles. Some, but not all, aspects of these activities have the potential for environmental impacts. This section identifies the major aspects of each activity which may affect the environment and notes why other aspects were determined to not have this potential.

Some new facilities may be required at contractor manufacturing areas and at contractor and government testing facilities at Edwards AFB, CA and Vandenberg AFB, CA. Every effort will be made to utilize existing facilities for aircraft manufacturing and testing. Modifications to manufacturing and test facilities are projected to be minor.

Land-use changes resulting from an air mobile FSED decision would be restricted to areas where selected contractors may be required to modify or expand existing facilities. A comparable situation exists at both government and contractor test sites. These modifications and expansions, if they occur, are expected to be generally compatible with adjacent land uses.

KEY ISSUES

The key issues involved in FSED of the air mobile system can generally be grouped into three levels of aggregation: national, regional, and site-specific effects.

NATIONAL LEVEL KEY ISSUES

Three key issues have been identified at the national level; competition for labor resources, competition for natural resources, and the allocation of money. These issues have been addressed in Volume II of the FEIS. Since the aircraft investment represent only a portion of FSED investments, national effects are not anticipated to change.

REGIONAL LEVEL KEY ISSUES

Of the $5 billion to $7 billion of FSED expenditures, those for aircraft and development are estimated to range from $600 million to one billion dollars. The airframe cost portion of this total is estimated at $250 to $400 million (1977 dollars). These expenditures will be used to purchase labor and natural resources. Direct labor, e.g., workers in aircraft manufacture and related industries, has recently been characterized by very high employment levels. Many new workers have transferred from other industries. Development of MX will create a demand for additional qualified workers. Competition among aircraft companies for currently employed workers would increase. Similarly, entry of unemployed or alternatively employed workers would be expected over a period of time as air mobile aircraft manufacture begins.

At the state or regional level, key issues relate to a population migration into state industrial areas which historically resist population growth. While many states throughout the nation will experience some degree of industrial and economic growth from an air mobile FSED, those states which have an existing capability to produce prototype aircraft will experience the greatest growth impacts. Aircraft industry employment is heaviest in California; therefore, much development work is likely to occur there. Two other states, Georgia and Washington, possess similar capabilities and will experience similar impacts.

Three growth-related factors have been identified as of primary importance:

- economic factors
- energy
- air and water

The number of jobs resulting from aircraft-related expenditures is greater than the number of employees directly working on the project. The business and household sector will supply goods and services directly

to the project, will be paid, and in turn, will demand goods and services from other businesses and households. The secondary suppliers will, in turn, rely on other suppliers ... and so on through the economy. These successive rounds of inter-industry and household consumption make up the indirect-induced component of the total economic effect.

TEST SITE KEY ISSUES

Various tests of air mobile components, subsystems, and models are being proposed for Edwards AFB and Vandenberg AFB, California. Key environmental issues associated with the tests assigned to these locations are discussed in Chapter III of this supplement.

1.0 THE PROJECT AND THE ENVIRONMENT

1.1 PROJECT OBJECTIVES OF THE AIR MOBILE OPTION

The overall objective of air mobile FSED to develop a weapon system that will meet all defined mission objectives at an acceptable cost. FSED includes:

- Manufacture of prototype aircraft
- Manufacture of prototype missiles
- Aircraft flight testing
- Missile flight testing
- Full-scale system validation testing
- Component testing

Full-scale engineering development does not include choice of abasing location nor does it include construction of any production missiles or aircraft.

Aircraft (1.1.1)

The aircraft currently under consideration were discussed in Chapter 1 Section 3.1.

FSED will include the manufacturing of approximately five aircraft: three flight test aircraft; two non-flying static and fatigue test articles. Cost estimates are tentative and as program refinement continues, more precise figures will be available. The estimated cost to purchase these aircraft is $250 million to $400 million (1977 dollars).

Missiles (1.1.2)

The missiles currently under consideration were discussed in Chapter 1, Section 3.2 of the Supplement. FSED will include manufacturing of approximately 30 test missiles.

Validation and Testing (1.1.3)

The extent of testing required will depend on the type of aircraft and missile selected for FSED.

Air mobile missile component test activities would likely occur at Edwards AFB, California; Arnold Engineering Development Center, Tennessee; and Kirtland AFB, New Mexico. Such tests are not expected to generate inputs different from those analyzed in Volume II of the FEIS.

Missile and system flight tests are expected to occur at Vandenberg AFB, California, and at the Western Test Range, and are discussed in Chapter III of this Supplement.

1.2 THE ENVIRONMENT RELATED TO DEVELOPMENT OF A PROTOTYPE SYSTEM

Development of the air mobile system will have social and economic effects in specific regions of the country where construction occurs. In addition, national effects will occur through the consumption of resources that could have been used for other purposes. Volume II of the FEIS described the expected national impacts associated with FSED expenditures of $5 to $7 billion. Introduction of air mobile is not anticipated to significantly alter the national conclusions identified in the FEIS.

Areas of the nation with industrial specialization in aerospace employment and aircraft manufacture are projected to have the greatest change in output, earnings, and employment. Benefits such as technological development and national prestige, accrue to residents throughout the Nation. Specific impacts resulting from increased employment and growth will be local, while general impacts associated with system development will be nationwide.

Identification of Analysis Areas (1.2.1)

Aircraft FSED will draw on support industries in addition to those included in the aircraft industry. These support industries include Instrumentation, Communication, Primary and Fabricated Materials and Machine Shop Industries. Components of these industries are located in almost every state in the nation. This analysis for air mobile FSED focuses on those states where suppliers of either AMST or modified WBJs are currently located. These states include California, where McDonnell-Douglas produced the YC-15 prototype; Washington, where The Boeing Company produced the YC-14 prototype and is producing the 747-200F Freighter; and Georgia, where the Lockheed C5 aircraft was produced.

While the larger aircraft contracts between the Air Force and private industry will probably go to firms located in these states, secondary and tertiary contracts are expected to be let throughout the Nation. Figure 1-1 indicates a distribution of such contracting.

Existing Environment in the Selected FSED States (1.2.2)

Section 1.2.2 in Volume II of the FEIS contains a description of the general environmental characteristics of seven states which could potentially receive the greatest economic stimulation from FSED. These states are California, Washington, Colorado, Massachusetts, the New York metropolitan area, Texas, and Utah. The majority of the larger contracts between Air Force and private industry will probably be concentrated in those states for FSED.

Construction of the prototype missiles during FSED will have comparable impacts to those identified in the Milestone II FEIS. Manufacture of the aircraft will likely also be concentrated in the states identified in the FEIS with the exception of the potential derivative of the C-5 which could be constructed in the state of Georgia.

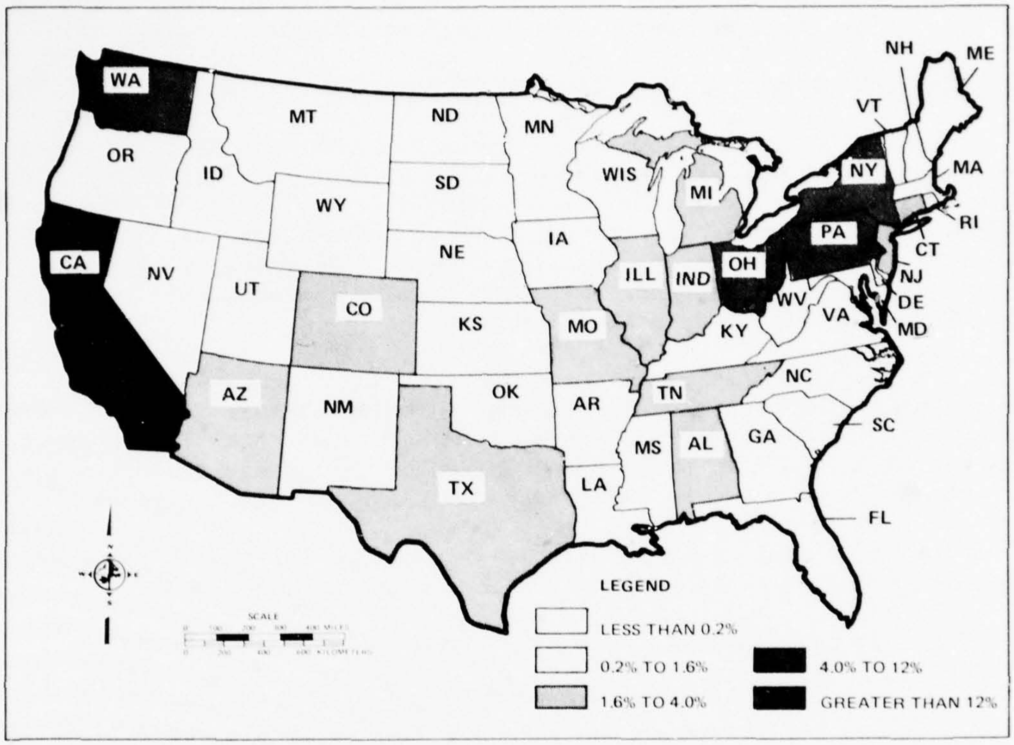
This supplement adds comparable information for the state of Georgia to that included in the FEIS for the seven states noted above.

The key environmental issues involved in FSED are related to production, employment, and growth. These include energy, water, air quality, and resources committed. The existing environment related to each of these key issues in the state of Georgia is discussed below.

Economic Factors (1.2.2.1)

Economic Specialization. Atlanta, Georgia's largest metropolitan area has major sources of employment in the combined trade divisions; Retail Trade is largest with 117,000 employees, but Wholesale Trade has an employment level of almost 70,000 persons (Economic Impact Forecast System 1979). Within this division, largest major group industries are General Merchandise (35,000 jobs) and Eating and Drinking Places (24,000 jobs).

Other large major group industries include Miscellaneous Business Services, and Special Trade Contractors, each with roughly 26,000 jobs; and Trucking and Warehousing, and Medical and Other Health Services, each comprised of about 17,000 jobs. The Manufacturing Division, although comprised of 115,000 persons, has experienced a declining employment share over the past decade. Largest major group industries in this division are the Transportation Equipment (17,000 jobs) and Fabricated Metal Products, with the former over three times as large as the latter group. Roughly one-half of the Transportation Equipment group jobs are located in the Aircraft Industry itself. Most other



STATE	PERCENT SHARE	STATE	PERCENT SHARE	STATE	PERCENT SHARE
CALIFORNIA	27.8	MARYLAND	1.3	MASSACHUSETTS	0.4
NEW YORK	9.1	NORTH CAROLINA	1.1	RHODE ISLAND	0.3
OHIO	7.3	OKLAHOMA	1.1	VERMONT	0.3
WASHINGTON	5.0	VIRGINIA	1.1	WEST VIRGINIA	0.3
PENNSYLVANIA	4.7	KANSAS	1.0	DELAWARE	0.2
ILLINOIS	3.9	WISCONSIN	1.0	MAINE	0.2
NEW JERSEY	3.0	MINNESOTA	0.9	NEW MEXICO	0.2
TENNESSEE	2.8	NEBRASKA	0.9	IDAHO	0.1
MICHIGAN	2.6	OREGON	0.7	NEVADA	0.1
CONNECTICUT	2.2	GEORGIA	0.6	MISSISSIPPI	0.1
TEXAS	2.2	IOWA	0.6	SOUTH DAKOTA	0.1
MISSOURI	2.0	LOUISIANA	0.6	WYOMING	0.1
ARIZONA	1.9	SOUTH CAROLINA	0.6	MONTANA	0.03
ALABAMA	1.8	FLORIDA	0.5	ALASKA	0
COLORADO	1.7	KENTUCKY	0.5	HAWAII	0
INDIANA	1.7	NEW HAMPSHIRE	0.5	NORTH DAKOTA	0
UTAH	1.4	ARKANSAS	0.4		

SOURCE: CENSUS OF MANUFACTURES, 1972.

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Figure 1-1. Percent share of employment in aerospace and support industries in 1972. This census of manufacturing information is being updated although results are not anticipated prior to 1980.

aerospace support industries are also located in the Atlanta metropolitan area, and are large enough to supply local demands. Large contracts awarded in this area would require substantial second tier subcontracting outside the region.

Income and Earnings. Total earnings reported by the Bureau of Economic Analysis (BEA) in 1975 were $12.1 billion (1967 dollars) (BEA, 1977). State real per capita income has been consistently less than that for the Nation. In 1975, real per capita income was $3,146. Georgia experienced a 1965 to 1975 average annual growth rate of 3.1 percent. To reach projections for 1980, an annual growth rate of 5.1 percent would be necessary; given historic trends, this seems unlikely.

Employment. Total State employment in 1977 was about 2.1 million people (Georgia Department of Labor, Labor Information Systems, 1978). The latest available data are for 1975; Manufacturing was the largest employer in the Industrial Division, with about 20 percent of the total work force. Other major employers were Wholesale and Retail Trade (18.3 percent) and the Services division (16.0 percent).

Unemployment. In 1977, Georgia's rate of unemployment was about 6.9 percent of its civilian labor force (Georgia Employment Security Department, 1979). Available data through the third quarter of 1978 indicate sizable reductions in the state's unemployment rate. Thus, Georgia's employment picture has brightened considerably since the early-to-mid 1970's when unemployment reached a peak of 8.6 percent in 1975.

Energy Resources (1.2.2.2)

Energy. In general, Georgia is faced with some energy supply problems, with greatest capacity deficits predicted for the Atlanta region. Oak Ridge National Laboratories forecasts that by 1985, only the state's mideastern edge and its northwestern corner will have sufficient electric energy (ORNL, 1977).

Electricity. In 1975, only 10 percent of the electric energy produced in Georgia was hydrogenerated compared to 15 percent for the U.S. as a whole (U.S. Department of Commerce, 1976). The region's 1975 per million population consumption of electricity was 918 megawatts compared to the U.S. average of 884 megawatts. Electric production was 40.4 percent of generating capacity in 1975. The supplement to Table 1-1 shows other data on electricity generation in Georgia.

Gas. Gas and fuel oil supplies are adequate in the region, but are experiencing the same cost increases as the rest of the nation. The Supplement to Table 1-2 presents gas sales data for the region; 1975 sales and gas prices ranked Georgia in about the middle of the FSED states, but below the average across the U.S. as a whole (U.S. Department of Commerce, 1976).

Table 1-1. Supplement to Table 1-1. Summary of Electric Energy Data for the Full-Scale Engineering Development States.

STATE	ELECTRIC ENERGY PRODUCTION 1975 (GWh)[1]	ELECTRIC ENERGY GENERATING CAPACITY 1975 (MW)[2]	ELECTRIC PRODUCTION AS A PERCENT OF 1975 GENERATING CAPACITY	PERCENT OF ELECTRIC SALES BY CLASS OF SERVICE, 1974 (GWh)		
				RESIDENTIAL	COMMERCIAL	INDUSTRIAL
Georgia	44,016	12,446	40.4	38.1	26.3	34.8

[1]Gigawatt hours (KWh x 10^6)

[2]Megawatts (kW x 10^3)

Source: U.S. Department of Commerce, 1976-

Table 1-2. Supplement to Table 1-2. Summary of Gas Utility and Mineral Production for Full-Scale Engineering Development States.

STATE	GAS SALES 1975 VOLUME (btu x 10^{12})				COAL AND LIGNITE PRODUCTION, 1974 (TONS X 10^3) (METRIC TONS X 10^3)	CRUDE OIL PRODUCTION, 1974 (bbl x 10^6) (m^3 x 10^6)
	RESIDENTIAL	COMMERCIAL	INDUSTRIAL[1]	$ PER BTU X 10^6		
Georgia	87	44	179	1.12	—	—

[1]Covers natural, manufactured, mixed and liquid petroleum gas.

Sources: U.S. Department of Commerce, 1976; U.S. Department of Interior, 1976.

Air and Water Resources (1.2.2.3)

Air Quality. Monitoring for ozone in Georgia is conducted at only one location, Decatur. The 1975 statistics from Decatur, located near Atlanta, indicate many episodes when ozone concentrations exceeded national standards. Photo-chemical oxidants exceeding standards is a common event among most major metropolitan areas across the country; the Atlanta area is no exception (EPA, 1977).

Total suspended particulate concentrations are generally below or marginally over standards through the rural and suburban sections of

Georgia with moderate concentrations prevailing within the cities. Within the Atlanta area, primary particulate standards were exceeded only marginally on eight occasions in 1975.

Carbon monoxide, sulfur dioxide, and nitrogen dioxide concentrations all remain below state and national standards throughout most of Georgia. Within the Atlanta area, each of the three pollutants' maximum 1975 concentrations were less than half the national standard for each.

Georgia's air quality for the eleven year period 1966 to 1976 generally shows improvement; most air quality incidents appear to have occurred during the late sixties and early seventies (Georgia Department of Natural Resources, 1977).

Water. In general, Georgia should have adequate water supplies through the end of the century. Quality is adequate to good, however, pollution has become a serious issue, particularly in the state's southeastern portion (Hunt, 1974). Overall, annual dissolved solids in water withdrawn for public consumption have remained less than 150 parts per million. Average annual runoff for most of Georgia has been greater than 10 inches per year, with only its southeastern corner averaging 1 inch to 10 inches annually. January through April are months of peak runoff; 50 percent of the state's annual total rain falls in this period. Georgia's 1970 per capita water consumption of 1,200 gallons (4.5 m^3) per day ranks below most other FSED states, and well below that for the U.S. as a whole (U.S. Department of Commerce, 1976).

As elsewhere, most of Georgia's water is withdrawn from surface supplies, as the Supplement to Table 1-3 indicates.

2. RELATIONSHIP OF AIR MOBILE FSED TO LAND-USE PLANS, POLICIES, AND CONTROLS FOR THE AFFECTED AREA

Air Mobile FSED involves a diverse set of engineering and test programs which may affect land use in several areas. The degree of effect will depend chiefly upon the current economic and related community conditions at the time contracts are awarded and their schedules. For example, should the prototype aircraft be manufactured in an area with adequate investment in equipment and facilities that are currently underutilized, little or no plant expansion or other changes in the local economy and related land use would be anticipated. Conversely, manufacture in a location of high utilization of capital equipment and facilities and a shortage of skilled labor could require plant expansion, labor in-migration, and more use of land in a particular region.

In this situation, the project/land use plans relationships would depend upon the degree to which adequate land use plans and the policies for implementing these plans exist.

Table 1-3. Supplement to Table 1-3. Summary of water withdrawn per day in full-scale engineering development states, 1970.

STATE	WATER WITHDRAWN						FRESH WATER CONSUMED[3]	
	PER CAPITA[2]		TOTAL		SURFACE			
	GALLONS	m^3	ACRE-FT	$10^6 \times m^3$	ACRE-FT	$10^6 \times m^3$	ACRE-FT	$10^6 \times m^3$
Georgia	1,200	4.5	16,265	20.2	14,424	17.8	1,289	1.6

[1]Withdrawal signifies water physically withdrawn from a source.

[2]Based on population as of 1 April 1970.

[3]Evaporated, transpired, or incorporated into products; excludes irrigation conveyance losses by evapotranspiration.

Source: U.S. Department of Commerce, 1976.

Air Mobile FSED is not anticipated to necessitate modifications to the land use plans, policies, or controls of any areas affected by aircraft manufacture.

Impacts to local communities and areas may vary, but these cannot be detailed at the present time since choice of a specific contractor and specification of a particular manufacturing location will be made during FSED.

3. ENVIRONMENTAL IMPACTS OF THE PROJECT

3.1 INTRODUCTION

Air Mobile FSED will result in regional stimulation of employment. The degree of growth-related impacts will be dependent upon the levels of employment and unemployment within the region, the degree of regional industrial specialization, and the projected future regional conditions.

Thus, an area with higher unemployment with ample community services and related infrastructure facilities would be capable of absorbing significant growth and would likely perceive the growth effects as generally positive. Conversely, an area of very high employment and stressed community service facilities such as highways and wastewater facilities would likely perceive many of the growth effects as negative.

3.2 NATIONAL IMPLICATIONS OF FULL-SCALE ENGINEERING DEVELOPMENT

Air Mobile FSED as a whole is expected to cost from \$5 to \$7 billion (1977 dollars). Of this total, air frame manufacturing is projected to cost approximately \$250 to \$400 million for five aircraft.

National effects will be similar in kind to those treated in Volume II of the FEIS. Air Mobile Development represents a transfer of outputs from one set of regional economies to another. Detailed analysis is provided for those regions that could receive the greatest proportion of FSED contracts.

3.3 REGIONAL DISTRIBUTION OF AIR MOBILE IMPACTS

Basis for Regional FSED Impacts (3.3.1)

Full-scale engineering development has been estimated to require a total nationwide investment of \$5 to \$7 billion over a period of about 5 years. State shares have been given in Volume II of the FEIS. Aircraft investments comprise a portion of overall FSED expenditures, and will depend upon the number of planes designed and manufactured and their per unit cost. Aircraft investment ranges from \$250 million to \$400 million (1977 dollars).

The locations of the three manufacturers under consideration are typical of areas where the prototype aircraft manufacture would be expected to occur. Detailed impact analysis is presented for three regions, Los Angeles and Orange Counties, California; Atlanta, Georgia; and Seattle-Everett, Washington.

The Regional Industrial Multiplier System (RIMS) input/output methodology (see Appendix, Volume II, FEIS) is utilized to estimate state changes in output, earnings, and the number of jobs. The employment estimates from the Economic Impact Forecast System (EIFS) economic base multiplier are also provided in the discussions on each of the three regions. Estimates from the two systems are sufficiently comparable to support the level of change discussed.

For Air Mobile FSED, the most appropriate industry is the production of Aircraft and Parts. Within this category are those firms engaged in manufacturing or assembling complete aircraft. This industry also includes firms engaged in research and development on aircraft or in factory-type aircraft modification.

Table 3-5 presents the RIMS FSED impact parameters for the three main states selected for analysis as part of this Supplement. The more specialized or industrialized Southern California region has a higher output multiplier than the smaller, less specialized Atlanta area. The industry- and region- specific output-to-earnings ratios are approximately equivalent in the particular areas. The somewhat lower wage rates in the Atlanta area contribute to the higher number of employees per dollar of expenditures for that region as reflected in the employment-to-earnings ratio. Indirect earnings, which are distributed throughout the region's economy are region-specific but not industry-specific.

Secondary effects of investments may produce population shifts and localized growth which, in turn, may require land use changes. New jobs in an area will reduce unemployment and encourage in-migration; the magnitude of in-migration will depend upon the number of new jobs and the availability of local labor with appropriate skills. New people may

Supplement to Table 3-5. Full-scale engineering development coefficients to estimate economic effect.

STATE[1]	AEROSPACE GROSS OUTPUT MULTIPLIER	OUTPUT-TO-EARNINGS RATIO	EMPLOYMENT-TO-EARNINGS[2] RATIO	
			AEROSPACE	RESIDUAL
California (Los Angeles-Orange Co.)	3.299	0.324	53.4	77.6
Washington (Seattle-Everett)	2.924	0.327	55.1	74.6
Georgia (Atlanta)	2.140	0.336	53.6[3]	80.59
National	4.470	0.3400	64.98	86.34

[1]Use of specific state coefficients would tend to underestimate effects; therefore, the coefficients for the major aerospace manufacturing centers have been used as a surrogate.

[2]Employment per million dollars of earnings.

[3]This ratio was derived from statewide data for the Transportation Industry, SIC Code 3700. Detailed employment data were not available for SIC Code 3721, Aircraft and Parts, due to disclosure provision.

Source: Bureau of Economic Analysis, 1978; 1972 Census of Manufacturers.

require housing, schools, commercial areas, highways, recreational areas, and a host of additional services. In the three urbanized areas where prototype manufacturing may occur, these new uses are not anticipated to represent significant change, although the relative negative impacts of growth are projected to be somewhat greater in the Seattle region than in the Atlanta region due to the recent trends of manufacturing employment within the two regions.

The Supplement to Table 3-6 presents an estimate of each region's ability to supply goods and services required in the Aircraft and Parts industry. Location Quotients (LQs) measure an industry's ability to

Supplement to Table 3-6. Location quotients for aircraft-related industries — 1972.

INDUSTRY		LOCATION QUOTIENTS			
STANDARD INDUSTRIAL CLASSIFICATION	TITLE	PERCENT OF TOTAL[1] INPUTS	CALIFORNIA REGION (LOS ANGELES-ORANGE)	WASHINGTON REGION (SEATTLE-EVERETT)	GEORGIA REGION (ATLANTA)
3721	Aircraft and Parts	37.2	6.52	5.44	3.46
3300	Primary Metals Industries	9.5	1.28	<1.0	1.09
3400	Fabricated Metal Products, except Machinery and Transportation Equipment	6.0	1.45	1.11	1.32
3590	Machine Shop Products	5.3	1.85	<1.0	<1.0
3662	Radio, Television and Communications Equipment	4.9	3.74	1.07	<1.0
(Excl. 731, 7396), 7692, 7694, pt. 7699	Miscellaneous Business Service	4.4	1.56	1.17	2.09
1900	Ordnance and Accessories	3.2	5.5	-	-
50, 52-59	Wholesale and Retail Trade	3.5	1.14	1.22	1.68
3540	Metalworking, Machinery, and Equipment	2.7	1.09	1.06	<1.0
3811, 382, 384	Engineering and Scientific Instruments	2.8	1.92	<1.0	-
6.5 (excl. pt 6561), 66	Real Estate	2.7	1.24	1.31	1.78
48 (excl. 483)	Communications, except Radio and Television	1.5	2.07	1.35	1.36
3560	General Industrial Machinery and Equipment	1.4	1.29	1.03	1.27

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[1] Out of 80 industries listed in the national input-output model which provide inputs to the nation's Aircraft and Parts industry, these 13 provide 85.1 percent. Percentage figures in this column represent particular industry's share of the Aircraft and Parts industry in the national model. For example, intra-industry production accounts for 37 percent of Aircraft and Parts' output.

Sources: Survey of Current Business, February 1974; EIFS, 1978, 1979.

supply; theoretically an LQ greater than 1.0 indicates that the industry supplies more than enough for local demand. Thus, it exports to other markets outside the region. An LQ less than 1.0 indicates the importation of that particular industry's goods into the region.

Of the three areas evaluated, California clearly dominates in its overall ability to supply local goods and services to the Aircraft and Parts Industry, while Washington and Georgia are roughly equivalent. Both the latter two states are lacking Ordnance and Accessories, and Georgia has little Engineering and Scientific Instruments industry. Location Quotients are technically defined as:

$$LQ_{ij} = \frac{X_{ij}/X_j}{z_i/z}$$

LQ_{ij} = Location Quotient for industry i region j

X_{ij} = employment in industry i in region j

X_j = total employment in region j

Z_i = national employment in industry i

Z = total national employment

The Aircraft and Parts Industry, itself, is a very important supplier: intra industry and sales account for 37 percent of the industry's direct inputs. All three states have had sufficiently large aircraft industries to more than supply local demand.

The Primary Metals industry is capable of meeting more than enough local demand in both California and Georgia. The remaining 11 industries, with the exception of Ordnance and Accessories, and Engineering and Scientific Instruments, are all present in the three states, and the majority have LQs greater than one.

The absolute magnitude of aerospace activities, noted in Figure 1-1 above, have indicated industry concentrations in California and Washington, and combined with the LQ data suggest that while Georgia has been historically able to supply most of the local needs in aircraft manufacture, the Atlanta area would likely have a greater number of inter-regional subcontracts with suppliers than would either the Seattle-Everett or the Los Angeles and Orange County areas.

Impacts Common to All Regions (3.3.2)

The impacts identified in this section are common to all regions where FSED expenditures are anticipated. These impacts are divided into two sections: Energy, and Air and Water.

Common Energy Consumption (3.3.2.1)

Electric energy and fuels are important inputs in manufacturing components and system assembly for Air Mobile FSED. Estimates of energy consumption within the industry involved in the MX program were derived from the data on the consumption of fuels and electric energy by industry and industry groups available in the 1972 Census of Manufacturers, published by the U.S. Bureau of Census in 1974. Coefficients for energy use were derived from data on industry groups which include and are closely related to aircraft manufacturing; Aircraft, Aircraft Engines and Engine Parts; and Aircraft Equipment, not elsewhere classified. The total consumption of energy by these groups was divided by the corresponding output (value of shipments) figures to determine the energy use per dollar of output. The kilowatt hour equivalent of all electricity and other fuels purchased was calculated and dollar values of shipments were adjusted to 1977 dollars to arrive at the current requirements of energy.

Each $1,000,000 of aircraft output (1977 dollars) would require about 1.2 million kilowatt hours (kwh) equivalent of purchased fuels and electric energy to construct the required facilities and equipment. Taking the airframe expenditures to be $400 million, gives a total energy requirement of 480 million kwh. Electricity impacts also result from direct and indirect-induced population in-migration into any particular region. Most recent available Bureau of Census estimates indicate that 1974 residential electricity sales equalled 579 x 109 kwh. On a yearly per capita basis, residential sales were 2,736 kwh, and this figure is utilized to assess population electricity consumption impacts.

Local impacts would vary, depending upon the location of the respective electrical demand and supply characteristics. California and Atlanta have projected energy deficits by 1985, although Washington has the potential for an energy surplus.

Common Water and Air Quality Effects (3.3.2.2)

Air Quality. MX expenditures for air mobile will increase employment opportunities in the aircraft industry and in supporting and service industries. To the extent that the local labor market cannot meet the increased demand for labor, or that a local low rate of unemployment encourages relocation from higher unemployment areas, there will be a population redistribution and local in-migration.

As population levels increase, pollution levels increase, even with active control strategies and vigorous enforcement practices. Control strategies and emission devices reduce the impacts and with population limits may prevent the normal level of pollution from reaching unhealthy concentrations.

Atmospheric emissions generated in residential areas primarily consist of combustion products from heating units, effluents from commonplace household activities, vehicle emissions, dust from disturbed areas, and burning where allowed. The primary pollutants that increase as the population level increases result from combustion and vehicle emissions. These are primarily carbon monoxide, nitrogen oxides, particulate matter, and hydrocarbons.

Carbon monoxide is directly related to vehicle traffic and goes up linearly with it. The controlled emissions from vehicles, hydrocarbons and nitrogen oxides, are likely to show an increase, also, but at a lower level than would be expected for carbon monoxide. The photochemical reaction that produces smog may, however, be enhanced by these increases and result in both air quality degradation and visibility reduction as population increases.

Water. Air Mobile FSED would require large amounts of water to support manufacturing and increased population. This report is confined to the use of water by major FSED contractors only. The focus is on the intake of water from public and private sources, the total usage of water, including recirculation, the amount of water discharged after use, and the amount of water treated before discharge.

Using the total output (value of shipments) and water consumption figures for the Aircraft and Parts industry (SIC Code 3721), coefficients were derived and adjusted to the 1977 dollar value. These derived coefficients were then multiplied by estimated national aerospace output to project U.S. water requirements of Air Mobile FSED.

Three values related to water requirements are important: intake, discharge, and consumption. Water intake averages about 2.0 gallons (0.008 m3) per dollar of output, but 95 percent is discharged so consumption is 5 percent of intake. Manufacturing water volume requirements are much higher, averaging 5.1 gallons (0.02 m3) per dollar of output, but water is used primarily for cooling purposes, and is recirculated several times before discharge. Because water is used primarily for cooling, treatment prior to discharge is required for only about 12 percent of the water discharged.

Table 3-7 summarizes water requirements for air mobile in the entire United States.

Table 3-7. Aircraft water requirements for full-scale engineering development of five aircraft. Millions of gallons (thousands m^3).

TYPE OF REQUIREMENT	WATER REQUIREMENTS FOR MANUFACTURE OF AIRCRAFT	
	AVERAGE ANNUAL	TOTAL
Intake	170 - 270 (0.6 - 1.0)	500 - 800 (1.9 - 3.0)
Discharge	160 - 260 (0.6 - 0.6)	480 - 760 (1.8 - 2.9)
Consumption	10 - 10 (0.04 - 0.04)	20 - 40 (0.08 - 0.2)

Specific Manufacturing Region Impacts (3.3.3)

Air Mobile FSED will involve the design and manufacture of approximately five aircraft. This activity will have social and economic effects centered in those regions where manufacturing will occur. Expenditures by the Air Force will create jobs, both directly in aerospace firms, and indirectly, throughout the regional economy. These jobs, if not filled by currently unemployed people, will induce population growth, and associated new demands of public service. This section discusses key impacts on selected regions.

California - Los Angeles and Orange Counties (3.3.3.1)

Economic Factors (3.3.3.1.1). California has a large, well-developed aerospace industry and could readily assimilate air mobile FSED investments. However, some subcontracting out of the state would still be expected, up to as much as 10-30 percent of contract investments (20 percent was used for the analysis.) For national air mobile investments ranging from $250 to $400 million for aircraft manufacture, California's share would range from $200 million ($250 million x 0.8) to $320 million. Assuming a three-year manufacturing program, the average annual investments into the state would range from $66.6 to $106.6 million. Aircraft-manufacturing-related changes in gross output could increase the state's total output by a total of $660 million to $1,060 million, or an average annual rate of $220 to $350 million (1977 dollars).

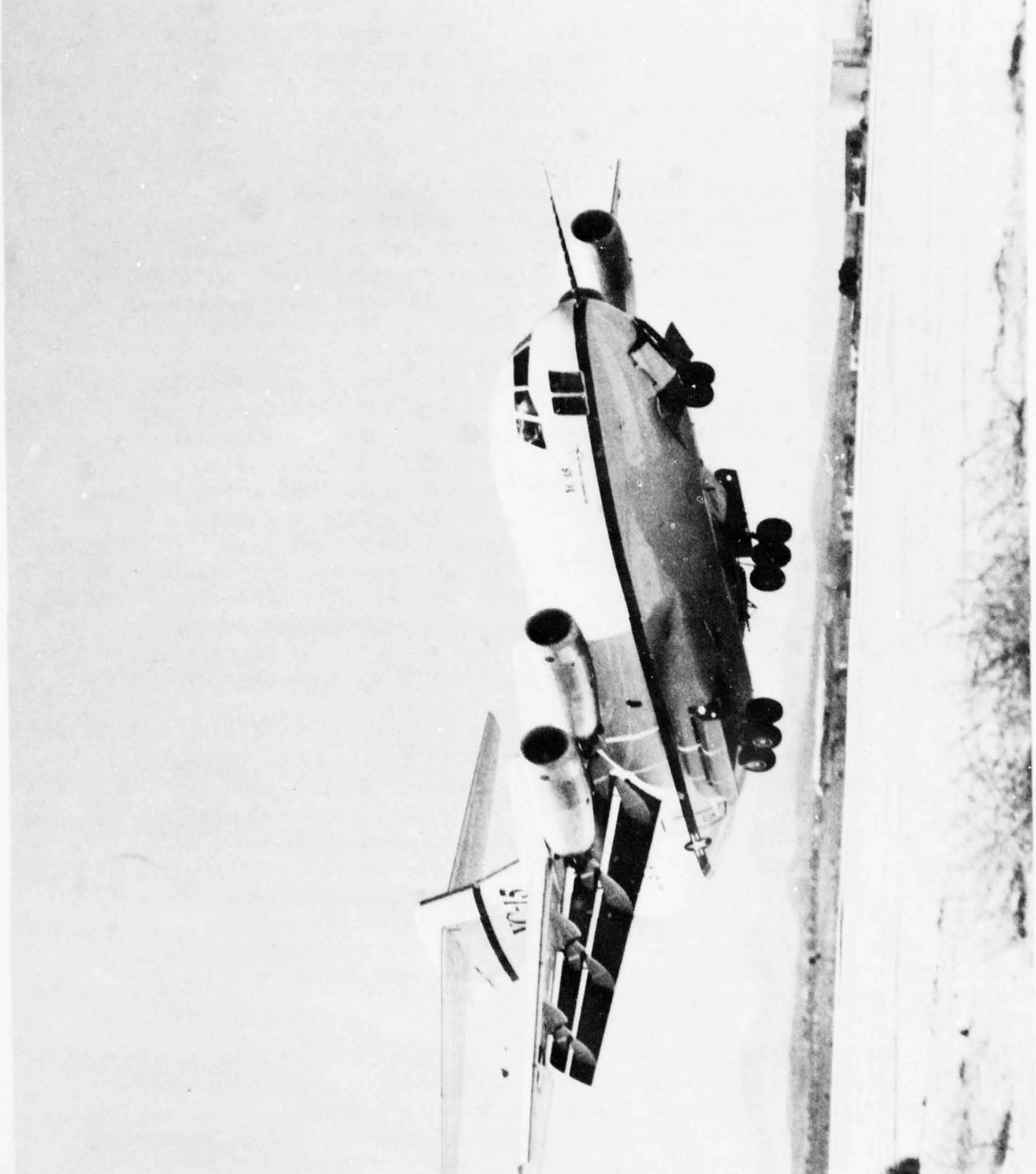
State industries receiving a large direct stimulus include: Other Transportation Vehicles; Electrical Machinery; Machinery, Except Electrical; Fabricated Metals Products; Scientific Instruments, and Primary Metals, in that order. Effects on total output (direct plus indirect-induced) will be concentrated in: Other Transportation Vehicles; Retail Trade; Electrical Machinery; Real Estate and Combinations; Wholesale Trade, and Food and Kindred Products, in that order.

In the FEIS, effects on California's gross output from FSED investments in the aerospace industry were estimated to be, at most, \$7.7 billion over the total five-year period, or about \$1.5 billion annually. Combined with air mobile, the largest total effects on state output would be about \$8.8 billion. Similarly, largest combined annual output increases could be about \$2.0 billion.

Regional employment increases associated with design and manufacture of aircraft are estimated to be as large as 8,800, which includes 2,100 direct and 6,700 indirect induced employees. State employment in 1977 was 9.3 million persons. This is projected to increase to 10.1 million persons by 1980 (State of California Employment Development Department, 1978 Projections derived from State Data and Bureau of Economic Analysis, 1974). The three-year projected employment increase is 500,000 persons. The manufacture of these aircraft would represent one to two percent of the statewide projected increase for the period. Over the same three-year period, Los Angeles and Orange Counties are projected to grow from 3.9 million to 4.3 million workers. The manufacture of aircraft would represent about 2 to 3 percent of the region's projected employment increase.

Effects on California's employment from FSED investments in the aerospace industry were estimated to equal, at most, 46,500 jobs (Volume II, FEIS). The design and manufacture of aircraft and missiles for the air mobile FSED could increase total estimated employment to approximately 55,300 jobs. Combined effects of the missile and aircraft being allocated to California could generate approximately 11 percent of the total projected 1977-1980 state-wide employment increase. Concentrated in the Los Angeles-Orange County area, MX air mobile FSED related employment could comprise as much as 14 percent of the projected three-year increase.

A large number of new jobs could be generated by MX air mobile FSED contracting in California in general, and specifically in Southern California. These new employment opportunities could result in population in-migration, but the current base is very large; except at a very localized level, effects should be beneficial and acceptable. Annual earnings resulting from aircraft design and manufacture investments by the Air Force could be as much as \$114 million which includes \$40 million direct earnings and \$74 million in direct-induced earnings (1977 dollars).



The McDonnell Douglas YC-15 prototype pictured above, was manufactured in Southern California.

State earnings equalled $125 billion in 1975, and are projected to increase to $167 billion by 1980 (Bureau of Economic Analysis, 1974, 1977). Comparable figures for the Los Angeles and Orange Counties indicate earnings are expected to increase from 1975's $47.0 to $75.1 billion by 1980. The maximum reasonable annual investment represents roughly 3.0 percent of California's 1975-1980 projected earnings growth of $42 billion and only slightly more for the $28 billion increase projected for Los Angeles and Orange counties.

Workers in directly affected industries will get about 38 percent of total earnings induced by aircraft design and manufacture while 62 percent will be distributed throughout the regional economy. The salaries of workers in directly affected industries will average about $18,900 per year, while workers in other industries affected by aircraft design and manufacture will average about $11,000 per year.

Combined effects of aircraft and missile design and manufacture in the aerospace industry could increase earnings by approximately:

Direct Earnings	$230 million
Indirect-Induced Earnings	$450 million
Total Earnings	*$680 million*

Together these total earnings changes would be about 2 percent of the projected 1975-1980 projected change in state earnings, and about 3 percent of those for Los Angeles and Orange Counties.

Population and Housing (3.3.3.1.2). Air mobile aircraft manufacturing employment could induce approximately 2,000 persons (workers plus dependents) to in-migrate to California. Other related jobs are anticipated to be filled by locally available workers. This level of in-migration amounts to less than 1 percent of the state's annual growth of over 300,000 persons since 1975. Other MX FSED investments in the aerospace industry were estimated to induce 9,000 - 10,000 persons to in-migrate into California (Volume II, FEIS).

Several metropolitan regions of the state may share the MX-related population growth. However, most increases will occur in Southern California. Even if it is assumed that all the MX-related increases would occur in the heart of Southern California (Los Angeles and Orange counties), an increase of 10,000 - 11,000 persons (air mobile plus other MX FSED investments) would represent approximately 10 to 25 percent of the region's annual population growth in recent years. The regional population grew by 42,300 in 1973-74, 70,300 in 1974-75, and 96,400 in 1975-76.

Regional housing demand could increase by approximately 1,000 units as a result of aircraft design and manufacture. Combined MX project effects could be approximately 5,000 units. If all MX-related contracts and associated employment were to occur in Southern California, the maximum additional demand of 5,000 housing units would represent approximately 0.3 percent of the average annual vacant units of around 200,000 in Los Angeles and Orange counties. With a total of about 3.3 million housing units of all types (51 percent owner-occupied, 49 percent renter-occupied), the region could provide a wide range of housing for the MX-induced population in-migration. Housing prices in the region average over $100,000 for a 3-bedroom single-family home, and in-migrants currently experience difficulty locating affordable housing. MX-induced growth could increase demand and exacerbate the existing housing shortage.

Energy (3.3.3.1.3). Aircraft manufacturing activities require about a 1.2 kwh equivalent of purchased fuels and electrical energy for each dollar of output. Design and manufacture of aircraft in California would likely require a total of about 0.2 to 0.4 billion kwh. Including both aircraft and missile-generated aerospace industry investments, total energy requirements could range from 2.5 to 3.1 billion kwh. Although California exports oil, energy in the form of natural gas and electricity is generally imported. Even with importation, current projections foresee the potential for energy shortages, particularly in natural gas (used both in the production of electricity and for space heating) in many metropolitan areas of the state within the next decade.

Limited population migration into California could occur as a result of aircraft and missile contracts. If so, additional electrical energy will also be required for their domestic needs. This would require about 32 million kwh additional energy consumption per year in California for FSED.

Air and Water Quality (3.3.3.1.4). The increased employment of workers in California would not result in a detectable level of air quality impacts. Should all employees from air mobile and other FSED project investments be in-migrants, a worst-case assumption, there would be a potential increase of about 2 percent of NOx level for one area. Since the primary emissions source is the automobile, any action taken to reduce vehicle travel will tend to reduce the impact of additional people in Southern California.

Aircraft manufacturing activities consume about 6 acre-ft (7,570.8 m^3) of water for each million dollars in sales. California's share of total air mobile investments has been estimated at $200 million to $320 million for aircraft design and manufacture. Demand for state water will be about 1,200 to 1,920 acre-ft (1.5 x 10^3 m^3 to 2.4 x 10^6 m^3). Maximum combined effects of aircraft manufacturing and

The Boeing YC-14 Prototype above and the 747-200F Freighter below were both manufactured in Washington State.

other FSED investments would generate demand for roughly 4,020 acre-ft (5.0×10^6 m^3).

Sufficient water to support manufacturing is likely to be available. Sufficient water to support induced population growth is a more complex issue. In general, 1 acre-ft (1,233.5 m^3) of water will supply five people for a year. Assuming each MX-related job migrant to have a family of 2.3 people, then each 100 MX in-migrating jobs will require 46 acre-ft (5.6×10^4 m^3) of water. If large-scale in-migration occurs, sufficient domestic water could become a growth-constraining problem, particularly in Southern California.

FSED air mobile is not anticipated to require modifications to the land-use plans, policies, or controls of any areas affected by aircraft manufacturing. Impacts to local communities and areas may vary, but these cannot be detailed at the present time since choice of a specific contractor and specification of a specific manufacturing location will be made during FSED.

Washington - Seattle-Everett Region (3.3.3.2)

Economic Factors (3.3.3.2.1). Washington has a large aerospace industry, which could assimilate air mobile investments. The region's aerospace industry is currently operating close to capacity, and projections indicate full employment of resources through the mid-1980s (Central Puget Sound Development District, 1978). Additionally, regional satellite, or support industries- are not extensively developed. Subcontracing out of the state would be expected to range from 25-50 percent or contract investments (for analysis, a 40 percent figure was utilized.) For air mobile investments, if aircraft were designed and manufactured in the Seattle-Everett region, Washington's share would range from \$150 to \$240 million totally, and from \$50 to \$80 million on an annual basis.

Investments of this magnitude will increase the state's total output by \$440 to \$700 million or an average annual of approximately \$150 to \$230 million (1977 dollars).

State industries receiving a large direct stimulus would include: Other Transportation Vehicles; Scientific Instruments; Machinery Except Electrical; Electrical Machinery; Miscellaneous Business Services; and Wholesale Trade, in that order.

The effects on total output (direct plus indirect-induced) will be concentrated in: Other Transportation Vehicles; Retail Trade; Real Estate and Combinations; Wholesale Trade; Food and Kindred Products; and Miscellaneous Business Services, in that order.

Effects on Washington's annual earnings from FSED investments in missile manufacturers were estimated to reach, at most, \$82.6 million. When combined with aircraft design and manufacturing, the largest total effects on earnings could be approximately \$160 million annually. Combined effects could exceed four percent of the state's net projected earnings gross for the 1975-1980 period, and about five percent of the five year earnings gross projected for the Seattle-Everett region.

Population and Housing (3.3.3.2.2). Air mobile aircraft design and manufacturing employment could induce approximately 2000 persons to inmigrate to the Seattle-Everett region. This includes an estimated 680 workers plus their families. Other MX-investments in missile manufacturing could induce 1,600-1,700 persons to in-migrate into Washington (Volume II, FEIS). Combined MX-induced effects represent less than one percent of the state's 1975-1980 projected gross of 362,000 persons.

Statewide housing demand could range up to 1,500 units. The Seattle-Everett metropolitan area, where most aircraft and support employment is located, is currently characterized by a very low vacancy factor. Localized housing impact could be substantial.

Energy Impact (3.3.3.2.3). At the rate of 1.2 kwh for each dollar of aircraft industry output, and with an expected upper limit of \$250 million output in Washington, project-related energy requirements could be about 0.3 billion kwh. Population in-migration would result in increased electrical energy demands. Air mobile would generate, at most, additional demand for electrical energy of 5.4 million kwh per year, and combined, all FSED investments 10.1 million kwh per year.

Regional increased employment resulting from aircraft design and manufacture could reach a total of 5,700 employees, which includes 1,700 direct employees and 4,000 indirect-induced employees . State employment in 1977 was 1.5 million persons, and this is projected to increase to 1.6 million persons by 1980 (Washington State Employment Security Department, 1978a, projections derived from state data and Bureau of Economic Analysis, 1974). The Seattle-Everett region's 1977 employment level was about 640,000 persons and is projected to increase to 680,000 workers over the same period (Washington State Employment Security Department, 1978b). Employment resulting from design and manufacturing would represent approximately 6 percent of the three-year projected statewide employment increase, and about 11 percent of that projected for the Seattle-Everett region. The EIFS economic base multiplier projects that air mobile contracting in Washington would generate approximately 5,600 jobs.

Effects on Washington's employment from FSED investments in the missile manufacturing industry were estimated to possibly reach 6,600 jobs (Volume II, FEIS). Both missile and aircraft manufacturing in Washington could create approximately 12,300 jobs. Combined effects would have represented approximately 13 percent of the projected state employment increase between 1977 and 1980, and about 24 percent of that for the Seattle-Everett region for the same three-year period. Although the current employment base is large, with the very low aerospace unemployment levels, the jobs created could stress localized economies.

Annual earnings resulting from aircraft design and manufacture investments could be as much as $76 million, which includes $30 million direct earnings and $46 million indirect-induced earnings. State earnings equalled $18.8 billion in 1975 and are projected to increase to $24.2 billion by 1980 (Bureau of Economic Analysis, 1974, 1977). Those for the Seattle-Everett region are projected to increase from $7.8 to $11.3 billion over the same period. Earnings from design and manufacture of aircraft represent roughly 1 percent of 1975-1980 net projected state earnings growth of $5.4 billion, and about 2 percent of the region's five-year projected earnings growth.

Workers in directly affected industries will get about 38 percent of total air mobile-related earnings; 62 percent will be distributed throughout the regional economy. Workers in directly affected industries will average $18,000, while workers in other industries affected by air mobile would average about $11,500 per year.

Effects on Washington's annual earnings from FSED investments in missile manufacture were estimated to reach, at most, $82.6 million per year, and combined, all FSED investments 10.1 million kwh per year.

Air and Water Quality (3.3.3.2.4). The Seattle-Everett area has some air quality problems. Nitrogen dioxide (NO_2) levels reach 9.2 x 10^{-5} $\mu g/3$ per person. Particulate levels, which exceed the limits about 40 percent of the time, also add to the air quality problem but to a much lesser extent.

The influx of 1,400 workers and dependents from combined MX investments into the metropolitan area should have a relatively minor effect on air quality. However, both NO_2 and particulates will be slightly increased as a result of activities of the workers and their families.

Aircraft manufacturing activities consume about six acre-ft (7,570.8 m^3) of water for each million dollars in sales. Washington's

share of total aircraft design and manufacturing investments has been estimated at $150 to $240 million. Demand for state water will run about 900 acre-ft (1.1×10^6 m^3) to 1,440 acre-ft (1.8×10^6 m^3). Maximum combined effects of aircraft and missile design and manufacturing investments would generate demand for roughly 1,800 acre-ft (2.2×10^6 m^3). Each 100 MX jobs that induce population migration will require approximately 46 acre-ft/year (5.4×10^4 m^3/year) of water. Washington has sufficient water supplies to support anticipated growth.

Georgia-Atlanta Region (3.3.3.3)

Economic Factors (3.3.3.3.1). Georgia has a large aircraft industry, but its aerospace and supporting industry groups are not extensively developed (Figure 3-6). Thus, some subcontracting out of the state is expected, and may range from 25-50 percent of contract investment. Assuming a 40 percent contract expenditure to be external to the region, Georgia's share would range from $150 to $240 million. Annual investments into the state would range from $50 to $80 million. The state's total output will increase by $320 to $520 million or an annual average rate of $110 to $170 million (1977 dollars).

State industries receiving a large direct stimulus include: Miscellaneous Business Services; Electrical Machinery; Wholesale Trade; Real Estate and Combinations; Communications Equipment; and Machinery except Electrical, in that order.

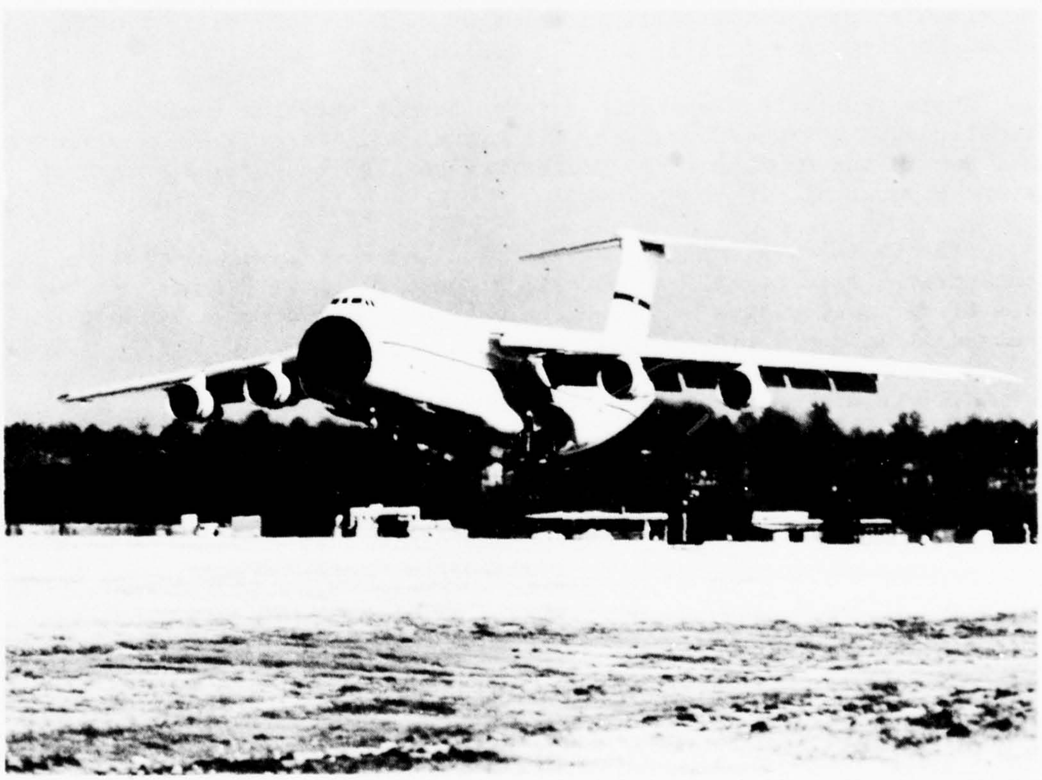
Effects on total output (direct plus indirect-induced) will be concentrated in: Other Transportation Vehicles; Retail Trade; Wholesale Trade; Real Estate and Combinations; Food and Kindred Products; and Miscellaneous Business Services.

Effects on Georgia's gross output from FSED investments in missile manufacture were estimated to be minimal (Volume II, FEIS). Total regional employment resulting from aircraft design and manufacturing investments is estimated to be at most 4,600 employees, which includes 1,700 direct employees and 2,900 indirect-induced employees.

Current state employment is 2.1 million persons, and this is projected to increase to about 2.3 million by 1980 (Georgia Department of Labor, Labor Information Systems, 1978. Projections derived from state data and Bureau of Economic Analysis, 1977). Comparable figures for the Atlanta region indicate a net employment growth of 87,000 persons to 1980's projected total of 800 thousand persons. Design and

manufacturing of the FSED aircraft would represent about 3 percent of the statewide projected increase over the three year period. Employment effects on the Atlanta region would be roughly twice as large. The EIFS economic base multiplier projects that contracting for aircraft design and manufacturing in Georgia would generate about 4,400 jobs. Effects on Georgia's employment from FSED investments in the missile-related industries were expected to be minimal (Volume II, FEIS), Thus, effects of MX-related contracting would result solely from aircraft design and manufacturing. Total annual earnings resulting from aircraft design and manufacture investments could be as much as $57 million, which includes direct earnings of $30 million and indirect-induced earnings of $27 million (1977 dollars).

State earnings were $22.0 billion in 1975 and are projected to increase to $32.0 billion by 1980 (Bureau of Economic Analysis, 1974, 1977). The Atlanta region is projected to have a five year growth of



Firgue 1-3. C-5 Aircraft were manufactured in Georgia.

$4.3 billion to a total of $14.3 billion in 1980. The maximum reasonable annual investment represents roughly 0.6 percent of Georgia's 1975-1980 net projected earnings growth of $10.0 billion. Effects on the region's earnings growth over the same period would be roughly twice as large. Workers in directly affected industires will get about 38 percent of total induced earnings; 62 percent will be distributed throughout the regional economy. Workers in directly affected industries will average $17,700, while workers in other industries affected by aircraft design and manufacture will average about $9,300 per year.

Population and Housing (3.3.3.3.2). Aircraft design and manufacturing may induce up to 2,000 persons to in-migrate to Georgia. This includes 680 workers plus their families. Other related jobs are projected to be filled by locally available workers. Statewide housing demand will increase by a maximum of 680 units. The Atlanta region where most aircraft and support employment is located, comprises roughly one-third of the state's approximate 2 million dwellings, and is characterized by relatively low vacancy rates. Housing impacts will be slight, in general, but may be noticeable at a localized level.

Energy (3.3.3.3.3). At the rate of 1.2 kwh for each dollar of aircraft industry output, and with increased aircraft output in Georgia of $240 million, energy requirements are estimated to equal 0.3 billion kwh. Population migration into Georgia could result in a demand for additional electrical energy. Population in-migration associated with aircraft design and manufacturing would generate, at most, an expected additional demand for electrical energy of 4.3 million kwh per year.

Air and Water Quality (3.3.3.3.4). Total suspended particulate concentrations are occasionally and marginally above ambient standards. Ozone is the pollutant with the greatest frequency of exceeding standards, but this is a problem characteristic of large metropolitan areas. The influx of 680 workers plus their families into the Atlanta region should have a relatively minor effect on air quality. Ozone concentrations would increase, but this should not represent a serious impact on the region's air quality.

Aircraft manufacturing activities consume about 6 acre-ft (1,200 m^3) of water for each million dollars in sales. The potential water demand for the Atlanta region is approximately equivalent to that associated with aircraft manufacturing in the Seattle-Everett region. In general, Atlanta has sufficient water resources to meet potential demand.

4. ALTERNATIVES

Air mobile alternatives include:

- Variations in aircraft/missile configurations
- Alternative development schedules.

4.1 VARIATION OF AIRCRAFT/MISSILE CONFIGURATIONS

Two types of aircraft are currently under consideration for air mobile ICBM use. These include AMSTs (typified by the YC-14 and YC-15) and wide-bodied jets (typified by the 747-200F freighter and C-5 aircraft).

Alternative aircraft could be considered. For example, other existing transport aircraft, after modification, might present a viable ICBM carrier alternative. However, such aircraft are smaller than those under active consideration, and they are capable of carrying only smaller, lighter missiles. If smaller aircraft are used, more aircraft and more missiles would be required to retain a force size comparable to that under active study. Additional airplanes entail higher operating requirements: more personnel, more hours, etc. These factors would significantly increase system costs. Thus, study of smaller existing aircraft has not been pursued.

Another approach would be to design completely new aircraft. If smaller aircraft are designed, cost problems similar to those mentioned above would be encountered. If aircraft larger than the wide-bodied jets are contemplated, their development, while technically feasible, would require considerably more expensive operational facilities. This approach would also extend the testing schedule. For these reasons there are no plans to design new aircraft.

Changes could be made in the three candidate groups of missiles presently considered for the air mobile option. Weights, guidance systems, propulsion systems, or number of reentry vehicles could be varied. Attendant effects upon costs, delivery dates, system goals, and regional production and test impacts would have to be quantified as changes are defined, but generally they would be anticipated to be similar to those addressed in the MX Milestone II FEIS.

Either increased costs or increased equipment requirements can be expected to have corresponding increased environmental impacts.

4.2 ALTERNATIVE DEVELOPMENT SCHEDULES

Impacts have been addressed in this DEIS Supplement in terms of a three-year design and development schedule. The three-year schedule is considered to be most realistic in terms of the managerial and technological complexity of achieving aircraft subsystem compatibility, performance, and reliability.

Shortening of the schedule could result in changes in impact depending upon the region of manufacture and the degree of current aircraft manufacturing activity in that region. Changes in impacts

could be relatively small for minor schedule variations although, an accelerated FSED would presumably place greatest strain upon the rapidly expanding west coast aircraft manufacturers.

Similarly, an extended air mobile program would have a proportionately reduced concentration of environmental impacts over reasonable limits. If Air Mobile FSED were to be delayed, full-scale production or deployment would be delayed, or the production/deployment phase must be shortened.

5. PROBABLE UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

5.1 PROBABLE ADVERSE ENVIRONMENTAL EFFECTS

Probable adverse environmental effects of Air Mobile FSED are comparable to those discussed in Volume II of the FEIS.

5.2 MITIGATION MEASURES PROPOSED TO MINIMIZE POTENTIAL IMPACTS

Mitigation measures are discussed in Volume II of the FEIS.

6. RELATIONSHIP BETWEEN LAND SHORT-TERM USES OF MAN'S ENVIRONMENT AND LONG-TERM PRODUCTIVITY

The short- and long-term relationships associated with Air Mobile FSED are similar to those delineated in Volume II of the FEIS. In general, FSED does not concentrate environmental effects that will produce long-term declines in the productivity of resources.

7. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Full-Scale Engineering Development is a prototype test program and does not result in the commitment of resources for production or operational deployment of any missile or aircraft. However, resources will be committed to provide for design, development, and testing phases of FSED. Aggregate cost is estimated to be \$5 to \$7 billion, resources, including labor, drawn from other activities through price inducements would represent a societal choice with resulting opportunities to use that resource in any other activity. Employees drawn from the unemployed would constitute a short-term beneficial use of a work force otherwise lost to society.

The actual requirements for commitment of scarce resources will be more clearly defined during FSED. All decisions regarding eventual

Air or Ground Mobile System production and basing locations will be made following an additional Deployment Area Selection Environmental Analysis with public review.

8. CONSIDERATIONS THAT OFFSET THE ADVERSE IMPACTS

The potential benefits of Air Mobile FSED are regional and national in scope. National benefits, however, were analyzed and presented in Volume II of the FEIS.

At the local level, FSED expenditures will create additional job opportunities and stimulate market demands for supplier goods and services. Further, the local tax base would increase, potentially lowering the tax burdens on local residents, assuming community infrastructure elements are adequate to accommodate the increased demands.

Air Mobile investments will also stimulate regional economies. First, this would be expected since workers directly employed on Air Mobile-affected industries would live throughout the region, not just in the particular area surrounding the contractor. Thus, their spending increases would be experienced regionwide. Second, as the directly affected industry expands, it is probable they would increase demands for goods and services supplied within the region. This, too, would stimulate regional economies. Thus, the multiplied impact to the initial project simulus will be felt regionwide, though not as directly as local effects.

9. DETAILS OF UNRESOLVED ISSUES

Air Mobile FSED may require development of new materials, designs, and support equipment. Since the Air Mobile system is still in a preliminary phase, there are several unresolved issues. Among the more important are:

- Timing of design, development, and testing of the prototype missile and aircraft.
- Component and system costs for missiles and aircraft.
- Selection of major contractors for the program.

Resolution of these issues is necessary before the location and magnitude of any potential impacts can be assessed in detail.

H.O.R.RIMS

THE LOS ANGELES REGION 3721- AIRCRAFT INDUSTRY

SIC	INDUSTRY NAME	ELEMENTS OF: DIRECT COMPONENT	INDIRECT-INDUCED COMPONENT	TOTAL MULTIPLIER
01	FARMS	0.0000	.0209	.0209
07	AGRICULTURAL SERVICES	0.0000	.0018	.0018
13	CRUDE PETROLEUM AND NATURAL GAS	0.0000	.0049	.0049
14	NONMETALLIC MINERAL MINING AND QUARRYING	0.0000	.0002	.0002
15-17	CONTRACT CONSTRUCTION	.0023	.0089	.0112
19	ORDNANCE	.0043	.0077	.0120
20	FOOD AND KINDRED PRODUCTS	0.0000	.0699	.0699
21	TOBACCO MANUFACTURES	0.0000	.0000	.0000
22	TEXTILE MILL PRODUCTS	.0005	.0033	.0038
23	APPAREL AND OTHER FABRICATED TEXTILE PRODUCTS	.0006	.0268	.0274
24	LUMBER AND WOOD PRODUCTS, EXC FURNITURE	.0000	.0027	.0027
25	FURNITURE AND FIXTURES	.0037	.0063	.0100
26	PAPER AND ALLIED PRODUCTS	.0004	.0105	.0110
27	PRINTING, PUBLISHING AND ALLIED PRODUCTS	.0002	.0101	.0103
28	CHEMICALS AND ALLIED PRODUCTS	.0012	.0224	.0236
29	PETROLEUM AND RELATED INDUSTRIES	.0024	.0219	.0243
30	RUBBER AND MISCELLANEOUS PLASTIC PRODUCTS	.0048	.0129	.0177
31	LEATHER AND LEATHER PRODUCTS	.0000	.0029	.0029
32	STONE, CLAY AND GLASS PRODUCTS	.0006	.0051	.0057
33	PRIMARY METALS INDUSTRIES	.0202	.0211	.0414
34	FABRICATED METALS PRODUCTS	.0334	.0244	.0578
35	MACHINERY EXCEPT ELECTRICAL	.0343	.0252	.0595
36	ELECTRICAL MACHINERY	.0577	.0310	.0887
371	MOTOR VECHICLES	.0001	.0133	.0134
372-379	OTHER TRANSPORTATION VECHICLES	.2912	.0550	1.3462
38	INSTRUMENTS	.0287	.0071	.0358
39	MISCELLANEOUS MANUFACTURING	0.0000	.0068	.0068
41	LOCAL SUBURBAN AND HIGHWAY PASSENGER TRANSPORTATION	0.0000	.0030	.0030
42	MOTOR FREIGHT TRANSPORTATION AND WAREHOUSING	.0018	.0106	.0124
44	WATER TRANSPORTATION	.0000	.0006	.0006
45	AIR TRANSPORTATION	.0006	.0043	.0049
46	PIPELINE TRANSPORTATION	.0000	.0006	.0006
47	TRANSPORTATION SERVICES, INCL CARRIER AFFLILIATES	0.0000	.0006	.0006
48	COMMUNICATIONS	.0081	.0193	.0274
49	PUBLIC UTILITIES	.0027	.0177	.0204
50	WHOLESALE TRADE	.0134	.0597	.0731
52-59	RETAIL TRADE	.0062	.1091	.1153
60	BANKING	.0009	.0122	.0132
61+67	CREDIT AGENCIES AND HOLDING AND INVESTMENT COMPANIES	0.0000	.0032	.0032
62	SECURITY AND COMMODITY BROKERS, DEALERS AND SERVICES	.0004	.0052	.0056
63	INSURANCE CARRIERS, INCL SOLICITORS	.0012	.0196	.0207
64	INSURANCE AGENTS, BROKERS AND SERVICES	0.0000	.0063	.0063
65+66	REAL ESTATE AND COMBINATIONS	.0123	.0678	.0802
70	LODGING PLACES	0.0000	.0019	.0019
72+76	PERSONAL AND MISCELLANEOUS REPAIR SERVICES	.0023	.0168	.0191
73	MISCELLANEOUS BUSINESS SERVICES	.0198	.0345	.0543
75	AUTO REPAIR AND SERVICES	.0016	.0165	.0182
78	MOTION PICTURES	.0002	.0049	.0051
79	AMUSEMENT AND RECREATION SERVICES, EXCL MOTION PICTS	0.0000	.0078	.0078
80	MEDICAL AND OTHER HEALTH SERVICES	0.0000	.0283	.0283
81+89	LEGAL AND MISCELLANEOUS PROFESSIONAL SERVICES	.0044	.0152	.0196
82	PRIVATE EDUCATIONAL SERVICES	0.0000	.0031	.0031
84+86	MUSEUMS AND NONPROFIT MEMBERSHIP ORGANIZATIONS	.0011	.0270	.0281
	HOUSEHOLDS	.3670	.4497	.8167
TOTAL		.9305	1.3687	3.2992

MULTIPLIER + COMPONENTS

DIRECT	.931
INDIRECT-INDUCED	1.369
GROSS OUTPUT MULTIPLIER	3.299

HOR ECOSCIENCES DIVISION SANTA BARBARA CALIFORNIA

H.D.R.RIMS THE SEATTLE REGION 3721- AIRCRAFT INDUSTRY

SIC	INDUSTRY NAME	ELEMENTS OF DIRECT COMPONENT	 INDIRECT-INDUCED COMPONENT	 TOTAL MULTIPLIER
01	FARMS	0.0000	.0172	.0172
07	AGRICULTURAL SERVICES	0.0000	.0015	.0015
10	METAL MINING	0.0000	.0000	.0000
11	COAL MINING	0.0000	.0000	.0000
13	CRUDE PETROLEUM AND NATURAL GAS	0.0000	.0000	.0000
14	NONMETALLIC MINERAL MINING AND QUARRYING	0.0000	.0009	.0009
15-17	CONTRACT CONSTRUCTION	.0026	.0092	.0119
19	ORDNANCE	.0039	.0027	.0066
20	FOOD AND KINDRED PRODUCTS	0.0000	.0566	.0566
22	TEXTILE MILL PRODUCTS	.0000	.0002	.0002
23	APPAREL AND OTHER FABRICATED TEXTILE PRODUCTS	.0002	.0080	.0082
24	LUMBER AND WOOD PRODUCTS, EXC FURNITURE	.0002	.0064	.0066
25	FURNITURE AND FIXTURES	.0024	.0022	.0046
26	PAPER AND ALLIED PRODUCTS	.0004	.0066	.0069
27	PRINTING, PUBLISHING AND ALLIED PRODUCTS	.0001	.0051	.0052
28	CHEMICALS AND ALLIED PRODUCTS	.0010	.0036	.0046
29	PETROLEUM AND RELATED INDUSTRIES	.0016	.0151	.0167
30	RUBBER AND MISCELLANEOUS PLASTIC PRODUCTS	.0014	.0022	.0036
31	LEATHER AND LEATHER PRODUCTS	.0000	.0004	.0005
32	STONE, CLAY AND GLASS PRODUCTS	.0009	.0034	.0043
33	PRIMARY METALS INDUSTRIES	.0070	.0163	.0233
34	FABRICATED METALS PRODUCTS	.0099	.0122	.0221
35	MACHINERY EXCEPT ELECTRICAL	.0258	.0120	.0378
36	ELECTRICAL MACHINERY	.0219	.0080	.0300
371	MOTOR VECHICLES	.0000	.0204	.0204
372-379	OTHER TRANSPORTATION VECHICLES	.2910	.0313	1.3222
38	INSTRUMENTS	.0270	.0023	.0293
39	MISCELLANEOUS MANUFACTURING	0.0000	.0027	.0027
41	LOCAL SUBURBAN AND HIGHWAY PASSENGER TRANSPORTATION	0.0000	.0016	.0016
42	MOTOR FREIGHT TRANSPORTATION AND WAREHOUSING	.0019	.0106	.0124
44	WATER TRANSPORTATION	.0001	.0022	.0023
45	AIR TRANSPORTATION	.0006	.0033	.0039
46	PIPELINE TRANSPORTATION	.0000	.0001	.0001
47	TRANSPORTATION SERVICES, INCL CARRIER AFFLILIATES	0.0000	.0005	.0005
48	COMMUNICATIONS	.0081	.0172	.0253
49	PUBLIC UTILITIES	.0035	.0264	.0299
50	WHOLESALE TRADE	.0134	.0577	.0711
52-59	RETAIL TRADE	.0067	.1160	.1227
60	BANKING	.0012	.0125	.0137
61+67	CREDIT AGENCIES AND HOLDING AND INVESTMENT COMPANIES	0.0000	.0025	.0025
62	SECURITY AND COMMODITY BROKERS, DEALERS AND SERVICES	.0003	.0032	.0035
63	INSURANCE CARRIERS, INCL SOLICITORS	.0012	.0188	.0200
64	INSURANCE AGENTS, BROKERS AND SERVICES	0.0000	.0061	.0061
65+66	REAL ESTATE AND COMBINATIONS	.0124	.0614	.0738
70	LODGING PLACES	0.0000	.0021	.0021
72+76	PERSONAL AND MISCELLANEOUS REPAIR SERVICES	.0024	.0151	.0175
73	MISCELLANEOUS BUSINESS SERVICES	.0198	.0268	.0466
75	AUTO REPAIR AND SERVICES	.0016	.0168	.0185
78	MOTION PICTURES	.0002	.0033	.0034
79	AMUSEMENT AND RECREATION SERVICES, EXCL MOTION PICTS	0.0000	.0065	.0065
80	MEDICAL AND OTHER HEALTH SERVICES	0.0000	.0258	.0258
81+89	LEGAL AND MISCELLANEOUS PROFESSIONAL SERVICES	.0044	.0133	.0176
82	PRIVATE EDUCATIONAL SERVICES	0.0000	.0014	.0014
84+86	MUSEUMS AND NONPROFIT MEMBERSHIP ORGANIZATIONS	.0012	.0112	.0124
	HOUSEHOLDS	.3670	.3716	.7386
TOTAL		.8432	1.0804	2.9236

MULTIPLIER + COMPONENTS

DIRECT	.843
INDIRECT-INDUCED	1.080
GROSS OUTPUT MULTIPLIER	2.924

HDR ECOSCIENCES DIVISION SANTA BARBARA CALIFORNIA

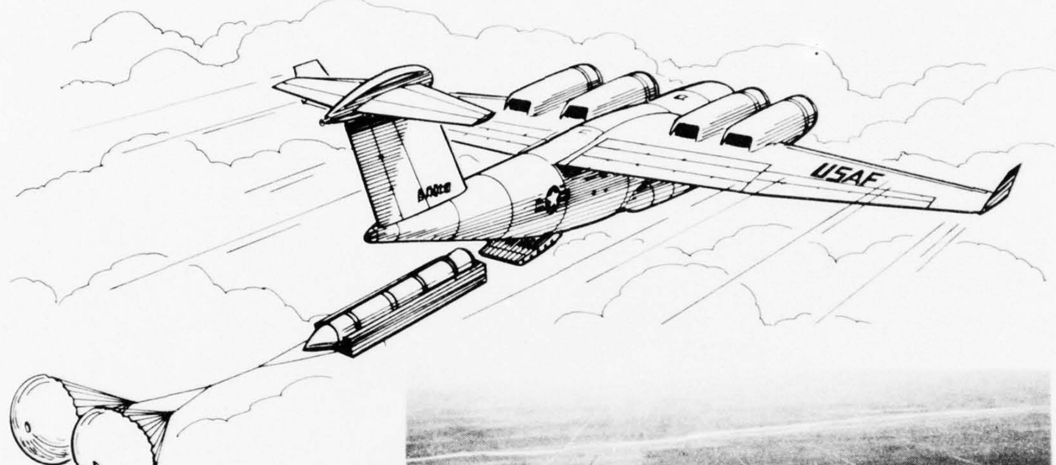
SIC	INDUSTRY NAME	ELEMENTS OF DIRECT COMPONENT	INDIRECT-INDUCED COMPONENT	TOTAL MULTIPLIER
01	FARMS	0.0000	.0100	.0100
07	AGRICULTURAL SERVICES	0.0000	.0009	.0009
11	COAL MINING	0.0000	.0000	.0000
13	CRUDE PETROLEUM AND NATURAL GAS	0.0000	.0000	.0000
14	NONMETALLIC MINERAL MINING AND QUARRYING	0.0000	.0005	.0005
15-17	CONTRACT CONSTRUCTION	.0029	.0063	.0092
19	ORDNANCE	.0001	.0000	.0001
20	FOOD AND KINDRED PRODUCTS	0.0000	.0375	.0375
22	TEXTILE MILL PRODUCTS	.0018	.0065	.0083
23	APPAREL AND OTHER FABRICATED TEXTILE PRODUCTS	.0003	.0107	.0110
24	LUMBER AND WOOD PRODUCTS, EXC FURNITURE	.0000	.0004	.0004
25	FURNITURE AND FIXTURES	.0006	.0014	.0020
26	PAPER AND ALLIED PRODUCTS	.0002	.0057	.0059
27	PRINTING, PUBLISHING AND ALLIED PRODUCTS	.0001	.0042	.0042
28	CHEMICALS AND ALLIED PRODUCTS	.0012	.0052	.0063
29	PETROLEUM AND RELATED INDUSTRIES	.0010	.0071	.0081
30	RUBBER AND MISCELLANEOUS PLASTIC PRODUCTS	.0008	.0012	.0021
31	LEATHER AND LEATHER PRODUCTS	0.0000	.0019	.0019
32	STONE, CLAY AND GLASS PRODUCTS	.0002	.0023	.0025
33	PRIMARY METALS INDUSTRIES	.0068	.0042	.0110
34	FABRICATED METALS PRODUCTS	.0041	.0027	.0068
35	MACHINERY EXCEPT ELECTRICAL	.0075	.0018	.0092
36	ELECTRICAL MACHINERY	.0142	.0032	.0173
371	MOTOR VECHICLES	.0000	.0164	.0164
372-379	OTHER TRANSPORTATION VECHICLES	.0027	.0001	1.0028
38	INSTRUMENTS	.0056	.0004	.0061
39	MISCELLANEOUS MANUFACTURING	0.0000	.0022	.0022
40	RAILROAD TRANSPORTATION	.0000	.0000	.0000
41	LOCAL SUBURBAN AND HIGHWAY PASSENGER TRANSPORTATION	0.0000	.0013	.0013
42	MOTOR FREIGHT TRANSPORTATION AND WAREHOUSING	.0021	.0078	.0100
44	WATER TRANSPORTATION	.0000	.0000	.0000
45	AIR TRANSPORTATION	.0006	.0018	.0024
46	PIPELINE TRANSPORTATION	.0000	.0004	.0004
47	TRANSPORTATION SERVICES, INCL CARRIER AFFLILIATES	0.0000	.0003	.0003
48	COMMUNICATIONS	.0081	.0115	.0196
49	PUBLIC UTILITIES	.0028	.0157	.0185
50	WHOLESALE TRADE	.0134	.0405	.0538
52-59	RETAIL TRADE	.0063	.0835	.0898
60	BANKING	.0012	.0092	.0104
61+67	CREDIT AGENCIES AND HOLDING AND INVESTMENT COMPANIES	0.0000	.0019	.0019
62	SECURITY AND COMMODITY BROKERS, DEALERS AND SERVICES	.0004	.0028	.0031
63	INSURANCE CARRIERS, INCL SOLICITORS	.0012	.0157	.0169
64	INSURANCE AGENTS, BROKERS AND SERVICES	0.0000	.0052	.0052
65+66	REAL ESTATE AND COMBINATIONS	.0124	.0368	.0491
70	LODGING PLACES	0.0000	.0022	.0022
72+76	PERSONAL AND MISCELLANEOUS REPAIR SERVICES	.0025	.0127	.0152
73	MISCELLANEOUS BUSINESS SERVICES	.0198	.0164	.0362
75	AUTO REPAIR AND SERVICES	.0016	.0126	.0143
78	MOTION PICTURES	.0001	.0016	.0017
79	AMUSEMENT AND RECREATION SERVICES, EXCL MOTION PICTS	0.0000	.0026	.0026
80	MEDICAL AND OTHER HEALTH SERVICES	0.0000	.0158	.0158
81+89	LEGAL AND MISCELLANEOUS PROFESSIONAL SERVICES	.0044	.0072	.0115
82	PRIVATE EDUCATIONAL SERVICES	0.0000	.0037	.0037
84+86	MUSEUMS AND NONPROFIT MEMBERSHIP ORGANIZATIONS	.0010	.0043	.0053
	HOUSEHOLDS	.3670	.1986	.5655
TOTAL		.4948	.6449	2.1397

MULTIPLIER + COMPONENTS

DIRECT	.495
INDIRECT-INDUCED	.645
GROSS OUTPUT MULTIPLIER	2.140

HDR ECOSCIENCES DIVISION SANTA BARBARA CALIFORNIA

III
Missile Flight Testing



SUMMARY

This section describes the environmental consequences of system level testing and missile assembly at the three Air Force bases where testing and assembly will take place: Vandenberg AFB, CA; Edwards AFB, CA; and Hill AFB, UT. The proposed missile, the aircraft designed to transport and launch the missile, and the subsystems of both will be flight tested during FSED.

Fifteen to 20 missile flight tests are expected to occur at Vandenberg AFB and over the Western Test Range (WTR). The test systems may be assembled at Edwards AFB, Hill AFB, or Vandenberg and then flown to the Western Test Range. Three ground launches are also planned for Vandenberg AFB early in the program. The facilities and construction worker requirements are considerably less for Air Mobile missile testing than for MPS testing.

Of the five test aircraft, three will be flight tested while the remaining two will be used for static and fatigue tests.

The key environmental issues at Vandenberg AFB have been discussed in detail in Volume III of the FEIS. The impacts remain substantially unchanged or reduced, e.g., air mobile testing requires less construction which, in turn, further reduces the possibility of importing labor into Santa Barabra County. Air Mobile testing will have less impact on air quality since most missile firings will occur off-shore. During road modifications there may be impacts on archaeological sites; however those may be mitigated by road alignment.

At Edwards AFB the air quality and biological impacts will be negligible. That is true of the socioeconomic impact during the construction phase due to the low number of workers required (approximately 40). This demand can be met by the existing labor force.

Air mobile FSED, however, will have more of an impact since 80 percent of the air mobile direct-related jobs (300 - 500) will require worker importation. Housing will also be impacted. Impact at Edwards will not be severe during either the air mobile construction or operations phases.

Hill AFB, under consideration for the location of a missile assembly building, would experience negligible environmental impacts by the construction and operation of such a facility.

Within the air mobile option, the following alternatives to the missile and aircraft flight test program are:

- Reduction in number of missile and aircraft flight tests
- Missile flight tests at other locations
- Aircraft flight tests at other locations
- Use of existing facilities

INTRODUCTION

Missile system flight tests are expected to occur at Vandenberg Air Force Base, CA (VAFB), and over the Western Test Range (as is the case with MPS. The facilities and personnel requirements at VAFB are considerably less for air mobile than for MPS. Air mobile requires facilities, personnel, and activities at Edwards AFB (EAFB) beyond those envisioned for MPS. Hill Air Force Base (HAFB), UT, may be used as a missile assembly site.

1. THE PROJECT AND THE ENVIRONMENT

1.1 DESCRIPTION OF THE PROJECT

The MX air mobile Flight Test Program involves flight testing — both the proposed missile and the aircraft designed to transport and launch the missile. Two types of aircraft are being considered: modified Advanced Medium Short Takeoff and Landing Transports (AMSTs) and modified "Wide-bodied Jet" cargo aircraft (WbJs). The candidate missiles under consideration vary within the following ranges:

Diameter: 69, 83, 92 in. (175, 210, 235 cm)

Length: 50 to 60 ft (15 to 18 m)

Weight: 60,000 to 160,000 lb (27,000 to 72,600 kg)

Stages: 2 or 3

Both the aircraft and missile selected will be flight tested during FSED. Missile testing will include approximately three ground launches from Vandenberg AFB early in the program. These launches will be from existing but modified facilities. Modifications to the launch facility will be required for ground launches and to support the missile prior to launch. The missile will be assembled at the launch area, probably in a launch silo, followed by erection above ground. A new or modified road may be required to transport the missile from the existing rail handling facility to the launch pad. Construction will be limited, and exact requirements will be identified during FSED.

Approximately 15 to 20 flight tests of the missile will be conducted from the test aircraft selected. Air launches will be 20 to 50 mi (32 to 80 km) west of Vandenberg. The flight test missile will be placed in the aircraft at Hill AFB (potential assembly site), at Edwards AFB or at Vandenberg AFB, (Figure 1-1). Test flights will originate from Edwards AFB; the aircraft will then fly to Vandenberg AFB launch area for the appropriate tests. Trajectories for tests have not been firmly established but will approximate those of previous Minuteman tests. Launches will occur approximately every 60 days until completion of the test series with the first launch in early 1983. Test missiles will carry instrumentation packages rather than warheads. Launches will be over open ocean waters well clear of the offshore islands.

Figure 1-1. Location of USAF bases that may serve as assembly and test sites in the air mobile option.

Ten portable ground beacons will be sited at various temporary locations in the vicinity of VAFB for missile guidance tests. These will be small self-contained radio transmitters. Plans for call flight testing the proposed aircraft for the use of three flight test aircraft. Two other prototype aircraft will undergo static and fatigue testing.

The static test article, consisting if major airframe assemblies and the landing gear will be tested at the airframe contractor's facility to verify static strength and stiffness characteristics of the aircraft prior to first flight. An aircraft fatigue article will undergo durability, damage tolerance, and service life ground testing during the flight test program to verify the economic life of the airframe and identify critical areas of airframe design not found during component testing. The location of fatigue testing is yet to be determined.

Aerial delivery system tests will be conducted which involve dropping a simulated missile from the aircraft to determine aircraft and missile flight dynamics during extraction, the capability of the parachute systems, and related information. Because development of the aerial delivery system will precede availability of MX carrier flight test aircraft, earlier tests using existing aircraft are planned from mid-1981 to early 1982. Droploads may be increased incrementally from 10,000 lb (4,500 kg) to perhaps 160,000 lb (72,600 kg) with 40-50 drops planned. MX aircraft flight testing will begin with delivery of the first development test and evaluation DT&E flight test aircraft in mid 1982. The first MX carrier/missile launch will occur roughly one year later. The first MX air launches will continue through 1985.

1.2 DESCRIPTION OF THE EXISTING ENVIRONMENT

The key environmental areas of concern to be addressed in the full scale missile flight testing phase involve potential impacts to the physical, biological, and socioeconomic environments at the assembly and test sites. The existing environments, with emphasis on particularly sensitive features of those environments, are discussed in the following sections for the proposed test facilities at Vandenberg AFB and Edwards AFB and for the possible assembly site at Hill AFB. Since the existing environment for Vandenberg AFB has been described in detail in Volume III of the FEIS, only a summary of the environmental characteristics is presented in this supplement.

Vandenberg AFB Existing Environment (1.2.1)

Physical Environment (1.2.1.1)

The dominant topographic features at Vandenberg are typical of the California coast with coastal terraces and mesas drained by intervening creeks. While no major faults have been mapped within the Vandenberg

area, two branch faults, Lion's Head and Honda, with significant displacement are mapped on the base. Groundwater withdrawl generally exceeds recharge in the region. The overall air quality at Vandenberg is generally good. The prevailing northwesterly wind has a cleansing effect on air quality but emissions are blown inland and some air pollution is experienced. The Santa Ynex Valley and other areas downwind have experienced some particulate and oxidant concentrations in excess of national air quality standards. Because of this, Vandenberg and the surrounding area have been designated nonattainment by EPA for these two air pollutants. Increased noise levels do result from various aircraft operations and infrequent missile launches, but are not considered excessive in the local communities. Few complaints have been recorded concerning noise produced by missile launches in recent years.

Biological Environment (1.2.1.2)

Because Vandenberg AFB has long been relatively isolated and inaccessible to the public, the base contains intact habitat types that have been reduced in areal extent or which are highly disturbed in other coastal areas of California. These habitats support rare and protected species. A detailed discussion of these species is given in Volume III of the Milestone II FEIS. Endangered species protected by federal law include nesting colonies of the California least tern, the offshore brown pelican, and the unarmored three-spined stickleback. Representative common mammals on Vandenberg are mule deer, coyote, bobcat, rabbits, skunks, ground squirrels, and nocturnal rodents. Reptiles and amphibians are not particularly abundant. Land and shore birds are numerous in both kind and number.

Vandenberg is situated in an area of marked transition between northern and southern California. Many northern species reach their southern limits and, similarly, the distribution of many southern California species ends here. Relictual patches of northern California vegetation occur in moister areas and the chaparral of the windswept coastal mesas is unusual for its extremely low stature and for the species present. Currently, no plant species on Vandenberg are protected by federal or state threatened or endangered species legislation. However, several plants have been listed as proposed federal threatened or endangered species.

Socioeconomic Environment (1.2.1.3)

The Santa Barbarbara County Planning Department recently estimated the April 1977 population of the county to be 282,906 representing a small gain over the 1975 special census. The three leading sources of basic employment within the county are Vandenberg AFB, the University of California at Santa Barbara, and tourism. Vandenberg AFB, with over 10,000 jobs, is the dominant employer in Northern Santa Barbara County.

While energy supplies appear to be adequate for current and projected consumption, water resources are currently being reviewed for the county and the question of state water importation is being put to a countywide vote. The heavy demand for both domestic water and irrigation water compared to water reserves could conceivably affect growth in the region.

Proposed Project Site Environment (1.2.1.4)

MX ground test launches at VFAB will likely occur at abandoned Minuteman site(s) in the Shuman Canyon area of the base. The Shuman Canyon area is located at the foot of the southern flank of the Casmalia Hills, and it is dissected by complex drainages cutting across a relatively flat but sloping surface. Vegetation on the upland areas in the vicinity of the launch test site is largely annual grassland dominated by introduced annual grasses resulting from disturbance.

Archaeological sites are known to be numerous and generally well-preserved on Vandenberg Air Force Base. The Shuman Canyon areas has been identified as archaeologically sensitive.

Edwards AFB Existing Environment (1.2.2)

Edwards Air Force Base, CA, is a 301,000 area installation operated by the Air Force systems command. It is located in the California high desert, north of Los Angeles, CA, and separated from the Los Angeles area by the San Gabriel Mountains. The base lies in the Antelope Valley; the nearest major population centers are Lancaster and Palmdale, CA, approximately 16 and 24 miles respectively southwest of the base center (see Figure 1.2.2.1-1).

Edwards AFB activities include the Air Force Flight Test Center (AFFTC), the USAF Test Pilot School, the NASA Dryden Flight Research Center, the U.S. Army Aviation Engineering Flight Activity, and the USAF Rocket Propulsion Laboratory. The base is at an elevation of 2,302 ft, and generally has excellent year-round flying conditions, which, coupled with large uninhabited onbase smooth level areas (playa lakes) for routine or emergency landings, make it ideal for its related test activities. Employment varies with the activity level associated with the phasing in and out of specific projects, but is about 4,000 military and 5,000 civilian personnel, with an annual payroll of $68 million.

Physical Environment (1.2.2.1)

Topography (1.2.2.1.1). Edwards AFB is located in the California high desert in a northern portion of the Antelope Valley. Located along Rogers Dry Lake, one of the largest local playas, the bases long main runways have an elevation range of 2,200 to 2,300 ft above sea level. A few hills lie to the east of Rogers Lake. Thus, a constrasting terrain is afforded to the flat, monotonously level, large surface area of the dry lakes.

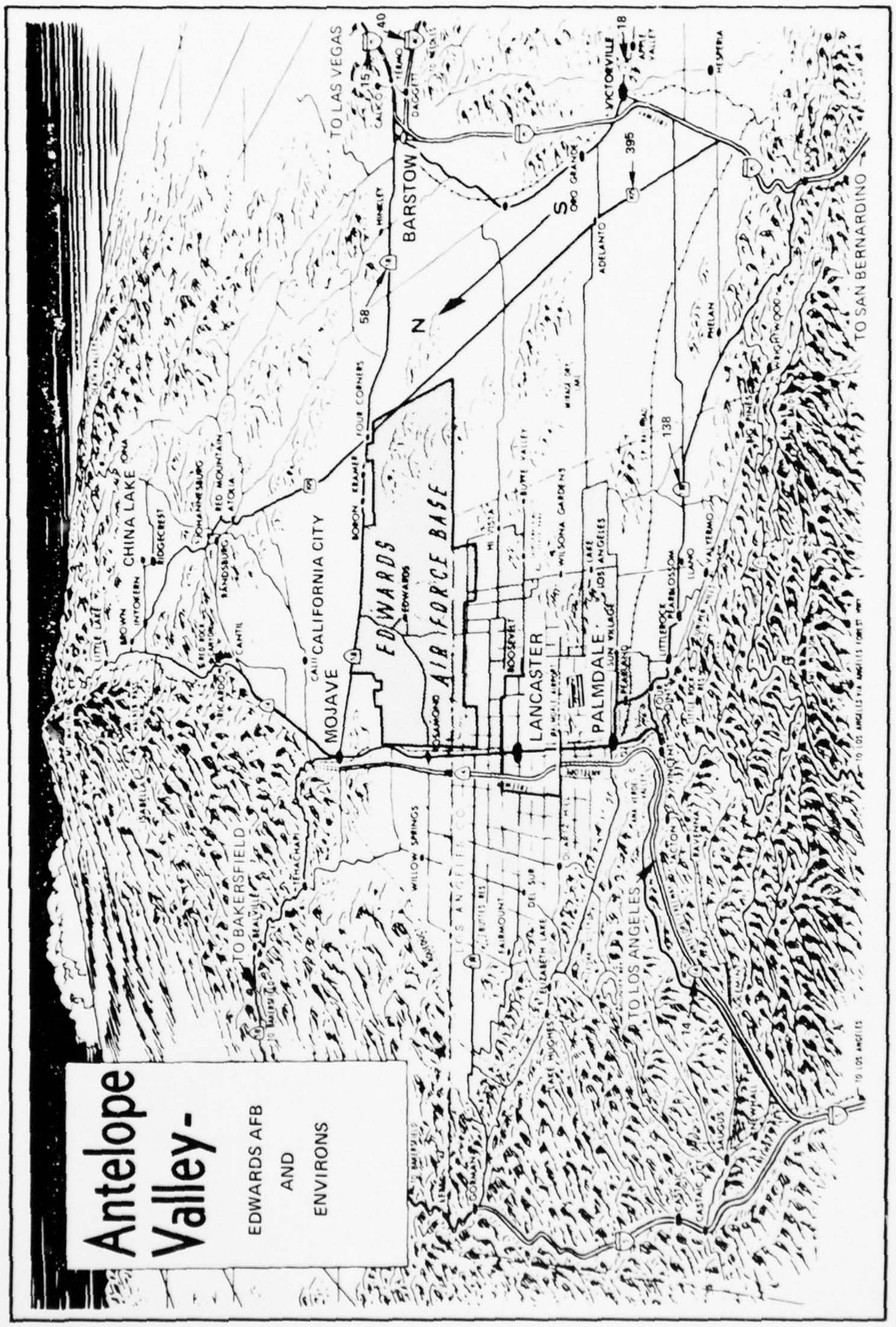


Figure 1.2.2.1-1. Edwards AFB landscape.

Geology (1.2.2.1.2). Exposed rocks in the vicinity of Edwards AFB range from lake and basin deposits, to hard rocks such as volcanics and granites. Four recognized buried faults are in the vicinity. The San Andreas Rift zone, 28 mi to the south, along the foothills of the San Gabriel Range, is a well-known seismically active fault zone.

The Edwards AFB area is indicated as being in a zone where severe damage to structures could occur.

The dry lakes on the base are useful for landings when dry, but not as buildable areas. Some of the areas are susceptible to wind on water erosion.

Hydrology (1.2.2.1.3). Edwards AFB is situated in a broad semiarid alluvial valley with no perennial streams, no extensive vegetation cover, and limited water. Hydrological sensitivity includes possible acceleration of soil erosion on disturbed ground, flash flooding potential, possible contamination of groundwater from accidental spills, and changes in evapotranspiration with surface disturbances.

The principal aquifer of Antelope Valley is contained in the unconsolidated alluvial deposits and is broken into a series of subunits and pumping depressions. Edwards AFB draws water from the Lancaster and the North Muroc subunits. Overdraft conditions currently exist in different parts of the valley. Plans for importing water by aqueduct through the Antelope Valley-East Kern Water Agency Domestic-Agriculture Water Network should stabilize withdrawl of groundwater at present levels.

Meteorology and Air Quality (1.2.2.1.4). The meteorology of the Edwards AFB area is not of great importance to the proposed alternative and therefore only a general summary is presented.

The climate of Edwards can be characterized as a generally cloud-free, hot, windy, and dry region. Local terrain, hills, and buttes have only a minimal effect upon the weather. Winds throughout the year are generally from the west or southwest with little seasonal variation. Winds are usually light in the winter, however, an occasional migratory winter storm may disturb the pattern causing stronger winds and shifting to a more northeasterly direction for a few days.

The more frequent, stronger winds are characteristic of the summer because of the large temperature differences between the sunlit and shaded slopes of nearby mountains that surround the Mojave Desert. These winds are occasionally accompanied by relatively short duration dust storms. After sunset, however, the winds generally diminish becoming nearly calm by sunrise.

Temperatures range between a low of about 10°F on early winter mornings to highs of 100 to 110°F during the summer mid-afternoons.

The infrequent rains can be intense and usually occur as showers associated with a cold front or a major storm passing inland from the southwest across southern California. Average annual precipitation is about 3.5 in. but rainfall accumulations of about 1 in. per hour may be expected once in 100 years.

Atmospheric stability over the desert area is extremely variable from very stable at night during the winter to very unstable in the summer in the mid-to-late afternoon.

The Edwards Air Force Base lies within the Southeast Desert Air Quality Control Region (AQCR #33), and the region has traditionally been considered a relatively clean area with little air pollution. Generally, the region can be characterized as experiencing air pollution levels attributable indirectly to population-related activity. Specifically, nitrogen oxides, ozone, and paritculates have been observed at levels which exceed the ambient air quality standards. However, no definite trends have been established.

Visibility conditions are a favorable asset to the Antelope Valley area. However, in terms of long-range visibility, a slight gradual decrease has been noted. In an effort to identify the cause of this decrease, the Upper Mojave Desert Air Quality Study has been implemented. Activities at Edwards AFB are not expected to be identified as a significant contributor to this problem.

Onbase Stationary Emission Sources. Emissions at Edwards AFB result from the combustion of fuel and solid waste by boilers, vehicles, aircraft, and incinerators and open burning. The primary source of air pollution emanating from the Flight Test Center is emissions from surface vehicles and aircraft engines. The missions from a normal amount of jet fuel used at Edwards AFB are computed as shown in Table 1.2.2-1.

Table 1.2.2-1.

POLLUTANT	EMISSIONS (tons/year)
CO	8,400
NO_x	4,200
HC	3,500

This action will not result in significant changes in the activity of surface vehicles so their baseline emissions are not included for the purpose of comparisons. The total fuel emission for Kern County is included in Table 1.2.2-2.

Noise (1.2.2.1.5). Because of the continued encroachment of urbanization toward Edwards, a primary environmental concern is potential public reaction to noise and sonic booms. (The proposed test program will not generate sonic booms.) Present noise emissions from aircraft takeoffs and landings are not considered to be a problem. The nearest community is about 15 mi away from the aircraft test complex.

Biological Environment (1.2.2.2)

Edwards AFB is located in the western Mojave Desert.

Endangered Species (1.2.2.2.1). No plant or animal species on the federal list of endangered species occur on the base. No species designated as endangered by the state reside on the base, but the rate Mojave ground squirrel could be present. This squirrel is widespread in the desert but rare throughout its range (Dimmitt, 1979). Habitat on the base is also suitable for the state-protected golden eagle (USAF, 1976).

Terrestrial Wildlife (1.2.2.2.2). Rodents (particularly kangaroo rats) are the dominant mammals in the Mojave Desert and reptiles are fairly well-represented, (Dimmitt, 1979).

In areas of creosote habitat (which covers much of Edwards AFB), abundant species are deert iguana (*Dipsosaurus dorsalis*), widewinder (*Crotalus cerastes*), desert tortoise (*Gropherus agassizii*), and Mirriam's kangaroo rat (*Dipodomys merriami*). Of these species, the desert tortoise is of particular concern since its numbers have decreased greatly over most of its range as a range of human activities. Habitat on three sides of Edwards AFB is very good for the tortoise with estimated densities of 100 to 250 animals per square mile (Dimmitt, 1979). This animal would be the most sensitive to habitat disturbance of any in the area.

Table 1.2.2-2. Total fuel emissions in Kern County (10^3 kg/yr).

	PARTICULATES	SO_2	NO_x	CO	HC
Total fuel emissions	787	3,875	24,311	86,463	14,630
Emissions per mi^2	< 1	1	3	11	2

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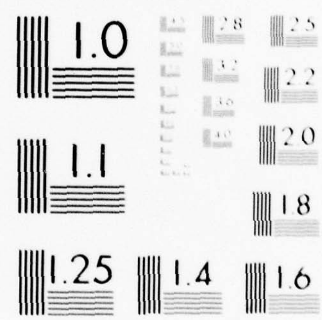


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Along washes, animals such as long-tailed brush lizards (Urosaurus gracious), hooded orioles (Icterus cucullotus), verdins (Auriparus flaviceps), zebra-tailed lizards (Callisaurus dracon-oides), mourning doves (Zenaidura macroura), black-tailed jack-rabits (Leupus californicus), and cactus mice (Peromyscus ere-micus) are common (Johnson et al., 1948).

The dominant plant community on Edwards AFB is creosote bush (Larrea divaricata) with white bursage (Ambrosia dumosa) common. Many annual plants, particularly winter annuals, are associated with this community. These are important for biomass production in favorable years.

Around the playas, salt bushes (Atriplex spp.) become dominant. At the periphery of the dry lake deposits in soils where the water table is very close to the surface occur species of pickleweed (Allenroidea occidentalis spp.), iodine bush (Suaeda torreyana), and salt grass (Distichlis spicata). On upper bajadas, Joshua trees (Yucca brevifolia) may occur but are usually not abundant below elevations of 3,000 feet (915 m).

Socioeconomic Environment (1.2.2.3)

Population (1.2.2.3.1). Most persons associated with the activities at Edwards AFB are not expected to commute more than 60 miles to and from the base. An area with a 60-mile radius has, therefore, been assumed to be the Region of Influence for the project. Table 1.2.2.3.1-1 identifies urban areas and their populations within this region which covers parts of the three counties of Kern, San Bernardino, and Los Angeles.

The effects of the flight test program on population growth in the region surrounding Edwards AFB are expected to occur primarily within the Lancaster/Palmdale area. Although several rural communities are closer to the base, they care characteristicslly lacking in available housing and other services to accommodate population in-migration to any large degree. Therefore, the discussion of historical and existing population growth characteristics will focus primarily upon the Lancaster/Palmdale area.

Lancaster is the Antelope Valley's central trade and administrative center. Population in the city has grown substantially in the past three decades. During the early 1950s, the advent of a diversifying economy which had previously been based on agriculture, resulted in extensive population in-migration. Between 1950 and 1960 the city's population grew dramatically from 13,011 to 31,362 for a very high average annual growth rate of 9.2 percent. Increased regional aerospace industrial activity between 1960 and 1970 continued to stimulate population in-migration as other commercial interests located in the area. The city's population substantially increased to 50,098 during this time

Table 1.2.2.3.1-1. Edwards AFB region populations for selected communities.

COUNTY/CITY OR TOWN	POPULATION	
	1970	MOST RECENT/YEAR
Kern County	332,700	349,874 (1975)
North Edwards	700	NA
Rosamond	2,281	NA
Boron	2,500	2,900 (1978)
Mojave	2,573	3,500 (1978)
California City	1,954	2,484 (1977)
San Bernardino County	682,233	696,871 (1975)
Barstow	17,442	18,025 (1978)
Adelanto	2,200	2,400 (1978)
Victorville	10,845	13,235 (1977)
North Los Angeles County	132,966	142,765 (1972)
Palmdale	8,511	12,800 (1977)
Lancaster	51,446	54,500 (1976)
Quartz Hill	4,935	7,600 (1978 est.)

Sources: State Department of Finance, 1977
California City Chamber of Commerce, 1978
Barstow Chamber of Commerce, 1978
Mojave Chamber of Commerce, 1978
Quartz Hill County Water District, 1978
Boron Community Services District, 1978
City of Adelanto, 1978
Edwards AFB Tab A-1, 1976
Citizens for the Incorporation of Lancaster, 1977
Qunton-Redgate, 1975 Palmdale Chamber of Commerce, 1978
Bureau of Census, 1977

period for an average annual rate of 4-7 percent. Little appreciable growth in aerospace activity since has resulted in a marked slowdown in the rate of population growth to an annual average of 1.4 percent. In 1976, Lancaster maintained an estimated population of 54,500.

Palmdale population growth has, during the past three decades been determined by the same general parameters as Lancaster; that is, its association with the aerospace industry. Typical aerospace facilities in this community are U.S. Air Force Plant 42, and those of Lockheed and Rockwell International. In 1970, the U.S. Census indicated a total of 8,511 persons in the city. This number increased at an average annual rate of 6.0 percent to 12,800 in 1977. The extent of future population growth in the region, and particularly in the Lancaster/Palmdale area will largely be determined by future industrial and commercial development in the area. Current planning guidelines and zoning both indicate a desire on the part of the respective local governments for encouraging rapid development.

Employment (1.2.2.3.2). Edwards AFB draws its civilian labor force from the three counties of Kern, San Bernardino, and Los Angeles. Some major employment characteristics of this three-county region are given below for 1975:

- Total employment stood at about 3.8 million; Los Angeles County accounted for 89.2 percent, San Bernardino County, 6.8 percent, and Kern County, 4.0 percent of the total employment.

- Unemployment in the region stood at about 353,000 persons, mostly located in the Los Angeles County. As many as 40,000 persons were unemployed in the two counties of San Bernardino and Kern.

- The rate of unemployment was 9.7 percent for the region with Kern County having the lowest rate of 8.1 percent.

- About 105,000 persons represented the construction work force in the region; 89 percent were located in Los Angeles County, 7 percent in San Bernardino, and the remaining 4 percent in Kern County.

Income (1.2.2.3.3). The economic region most likely to be influenced by project expenditures includes the three counties of Kern, San Bernardino, and Los Angeles. Some major economic characteristics of this Economic Effects Region (EER) are given below and detailed in Table 1.2.2.3.1-2.

- In 1975, the region had a total income of $52.9 billion; Los Angeles County accounted for 89.0 percent of this total; San Bernardino and Kern counties contributed 7.0 percent and 3.0 percent respectively.

Table 1.2.2.3.1-2. Edwards AFB economic effects area: Income, employment, and population indicators, 1975.

		KERN COUNTY	SAN BERNARDINO COUNTY	LOS ANGELES COUNTY	TOTAL ECONOMIC EFFECTS AREA
Income	Total Personal Income[1]	1,995.1	3,727.5	47,224.8	52,947.4
	Per Capita Income[2]	5,805	5,350	6,800	6,610
	Relative Per Capita Income[3]	0.98	0.91	1.15	1.12
	Transfer Payments[4]	290.1	689.8	6,559.9	7,540.0
	Total Earnings[5]	1,635.8	2,548.6	39,504.9	43,689.1
Earnings, by type[5]	Wage and Salary Disbursements	1,273.0	2,195.6	34,402.0	37,870.6
	Other Labor Income	64.4	133.3	2,416.6	2,614.3
	Farm Proprietors Income	182.0	41.6	61.4	285.0
	Other Proprietors Income	116.4	178.1	2,624.9	2,919.4
Earnings, by Industry[5]	Farm	288.9	74.4	102.7	466.0
	Private Nonfarm	919.9	1,733.1	33,221.6	35,874.6
	Federal Government	212.0	307.5	1,486.6	2,006.1
	State and Local Government	215.0	433.6	4,694.0	5,342.6
Employment[6]	Total	148,202	254.615	3,365,972	3,768,789
	Farm	20,186	7,810	9,578	17,594
	Private Nonfarm (excluding construction)	87,992	169,170	2,776,927	3,034,079
	Construction	3,945	7,460	94,069	105,474
	Government	36,079	70,165	485,398	591,642
Labor Force[6] Unemployment[7]	Civilian Labor Force	140,791	286,790	3,228,000	3,655,581
	Unemployment	11,383	28,811	313,000	353,194
	Unemployment Rate (percent)	8.1	10.0	9.7	9.7
Population	Population (in thousands)	343.7	696.8	6,944.9	7,985.4

[1] Millions of 1975 dollars, by place of residence.
[2] 1975 dollars
[3] Area per capita divided by national per capita.
[4] Retirement, unemployment insurance, public assistance.
[5] Millions of 1975 dollars, by place of work
[6] Number of jobs.
[7] Annual average.

Sources: Bureau of Economic Analysis, 1977; County Supervisors Association of California, 1977.

- Per capita income of $6,630 for the region was 12 percent higher than the national average mainly because of high incomes in Los Angeles County. Both Kern and San Bernardino counties had per capita incomes lower than the national average.

- Total earnings in the region amounted to $43.7 billion; 87 percent of the earnings were in the form of wages and salary disbursements.

- Private nonfarm earnings accounted for 82 percent of the total earnings, well over the proportion (78 percent) found in the U.S. economy. However, the range among counties were wide; 56 percent in Kern, 68 percent in San Bernardino, and 84 percent in Los Angeles County.

- Earnings in the Government sector amount to 16.8 percent of the total earnings in the region; the county-wide contributions were 29.1 percent in San Bernardino, 26.1 percent in Kern, and 15.6 percent in the Los Angeles County.

Housing (1.2.2.3.4). The availability of temporary and permanent housing is an important element in estimating potential impacts associated with new regional employment opportunties generated as a result of the flight testing program at Edwards AFB. It is anticipated that the substantial portion of project-associated and indirect in-migrants to the area will locate in the Lancaster-Palmdale area. Although several small rural communities are closer to the project site, permanent and temporary housing availability in these communities is minimal. Therefore, discussion of existing housing availability will be focused primarily on the Lancaster-Palmdale area. Table 1.2.2.3.4-1, indicates existing housing in the Edwards AFB region for all urban areas within a radius of 60 miles.

In 1976, there were 16,228 residential housing units in Lancaster of which 79 percent were single-family dwellings, 10 percent multiple-family dwellings, and the remainder mobile homes. At that time, residential housing sustained a 2.1 percent vacancy rate. Median monthly rent for unoccupied housing units in the city is currently $288 (Lancaster Chamber of Commerce, 1979). The high quality of housing that exists in Lancaster is considered a resource for the future. Over 75 percent of all housing in the city has been constructed since 1950, with a majority of that total since 1962. The older, centrally located housing units ranged in value from $25,000 to $30,000 in 1976, while newer units, located in western Lancaster, ranged from $30,000 to $60,000. Temporary housing is available in the city's seven hotels and motels which maintain a combined total of 641 units.

Table 1.2.2.3.4-1. Housing units in the Edwards AFB region.

CITY/TOWN	YEAR	TEMPORARY UNITS	PERMANENT UNITS
Kern County			
North Edwards	--	NA	NA
Rosamond	--	NA	NA
Boron	1978	30	750
Mojave	1978	218	960
California City	1977	123	969
San Bernardino County			
Barstow	1978	900	5,922
Adelanto	1978 est.	10	800
Victorville	1974	NA	4,321
North Los Angeles County			
Palmdale	1978	210	6,533[1]
Lancaster	1976	641	16,228
Quartz Hill	1978 est.	0	2,740

NA — Not available

[1]Does not include mobile homes

Sources: Boron Community Services District, 1978; Mojave Chamber of Commerce, 1978; Quartz Hill County Water District, 1978; City of Adelanto Planning Department, 1978; City of Victorville Planning Department, 1975; Citizens for the Incorporation of Lancaster, 1977; Palmdale Board of Realtors, 1979; City of Barstow, 1978.

Approximately 9,560 permanent housing units exist within the Palmdale planning area, which extends beyond the city limits (Palmdale Board of Realtors). The major portion of existing dwelling units were constructed prior to 1960. In the 1960s, housing expanded primarily to the east, south, and west (north Los Angeles General Plan Group, 1975), This trend currently continues. By 1980, 9,700 units are expected to exist within the planning area. At present, the most pressing housing issue in the community is the availability of low-cost housing which restricts purchase and renting by the elderly and young families. Currently, the median monthly rent for unoccupied housing units in the city is $325 (Palmdale Board of Realtors, 1979). Temporary housing is available in four motels which contain 210 units and in 10 trailer parks distributed throughout the city.

Current zoning indicates ample room for residential expansion in both Lancaster and Palmdale. However, as more individuals in-migrate to the area, housing availability will tend to decrease with sufficient corresponding housing development. This must be considered important in view of the flight test program at Edwards AFB and any other proposed projects.

Transportation (1.2.2.3.5). Access routes to Edwards AFB are shown on Figure 1.2.2.1-1.

Since Lancaster and Palmdale are the principal population and commercial centers in the Antelope Valley, their local circulation system and capacities merits closer attention. The principal north-south arteries between Palmdale and Lancaster are the Sierra Highway (State Route 138) and the Antelope Valley Freeway. Whereas the latter carries 17,000 to 19,000 vehicles daily, Sierra Highway carries most of the intercommunity traffic between these two cities, with a volume of 2,000 to 15,000 vehicles per day (Palmdale Community General Plan, 1975). A variety of possible routes exist between Lancaster/Palmdale and Edwards Air Force Base. Available 1974 data indicate that none of these roads carry over 4,000 vehicles per day, and most are in the 1,000-1,500 vehicles per day range.

Rush hour period traffic leaving the base to the west (Rosamond Boulevard) reaches 750 cars in a one-hour period. Approximately 80 percent of this flow is headed for Lancaster. Existing onbase roads have been determined to be capable of handling a considerable amount of additional traffic.

Three railroads provide freight service to the Antelope Valley:

1. Union Pacific — Chicago to Los Angeles

2. Santa Fe — Chicago to Los Angeles and San Francisco

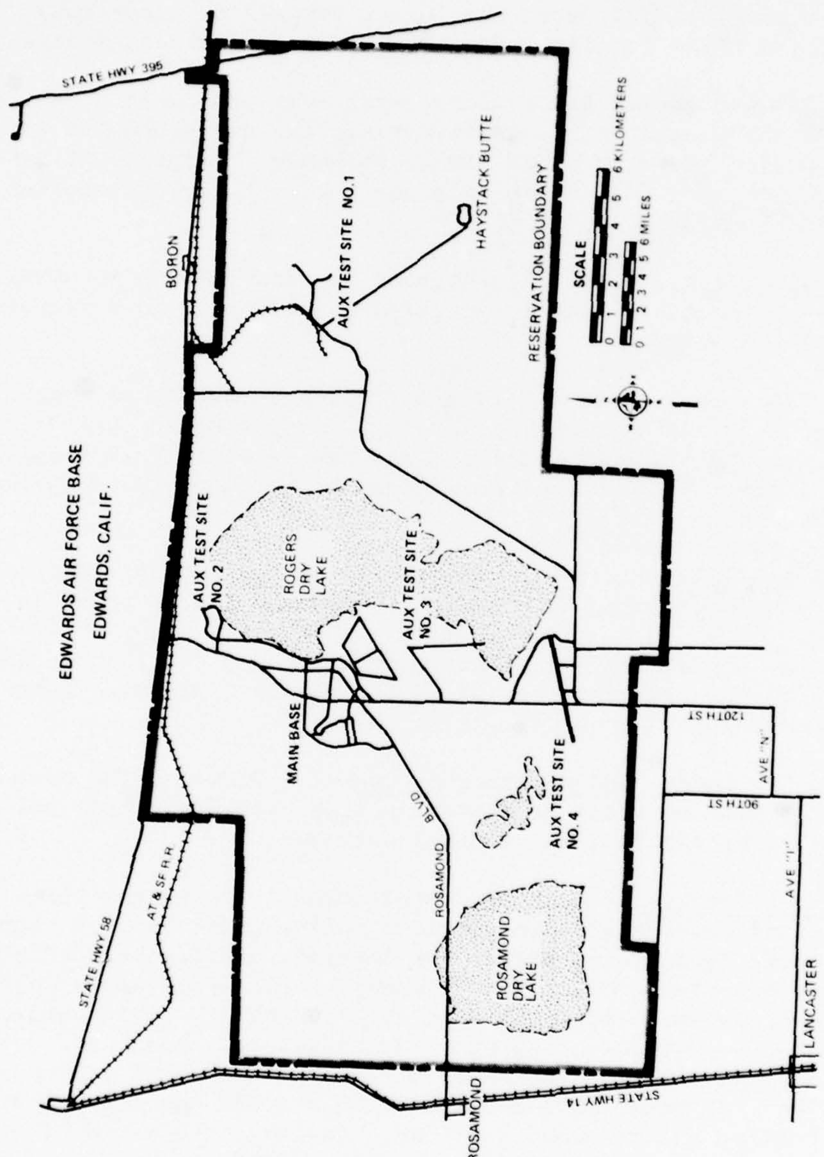


Figure 1.2.2.1-1.

3. Southern Pacific — New Orleans to Los Angeles and Los Angeles to Seattle.

Santa Fe is the only line serving the base from its east-west main line running along the north edge of the base. Sprus have been provided to the main base as well as to the Rocket Propulsion Laboratory. Junctions with the other two lines are located at Barstow and Mojave.

Only limited commercial airline service is available in the Antelope Valley. At the present time one feeder airline has scheduled flights from Los Angeles to Edwards AFB and to Palmdale. Airports at Lancaster (Fox Field), Mojave, California City and Quartz Hill have charter of air taxi service available.

Education (1.2.2.3.6). Flight test program impacts on population growth in the immediate region will also be reflected in increased demand for educational services.

Administration of elementary and secondary educational resources in the Lancaster-Palmdale area is primarily provided by the Palmdale School District, Lancaster School District, and the Angelope Valley Union High School District. Total school enrollment in March of 1978 equalled 33,389 students.

Educational facilities in Lancaster/Palmdale and the immediate area include: 6 high schools, 23 elementary schools, and 11 parochial schools.

Existing educational facilities are currently utilized at about 85 percent of the 1978 capacity of 20,000 pupils (Palmdale, Lancaster, and Antelope Valley School Districts, 1979).

Community Safety and Health Services (1.2.2.3.7). The community safety and health services addressed in this section include police protection, fire protection, and medical services.

Police Protection. Unincorporated communities in the three counties which surround Edwards AFB are provided police protection by respective county sheriff departments (Kern, Los Angeles, and San Bernardino) and to a lesser extent the California Highway Patrol (CHP) along major interstates and highways. Communities in the Edwards AFB region provided with sheriff and CHP protection include: North Edwards, Rosamond, Boron, Quartz Hill, and Mojave. The major urban areas proximal to Edwards AFB, Lancaster and Palmdale, each contract with the Los Angeles County Sheriff for full traffic and criminal services. In 1977, the ratio of officers per 1,000 population was 0.76 (Los Angeles Sheriff Dept.).

Fire Protection. Communities surrounding Edwards AFB are afforded fire protection by several means; on-call volunteer departments or respective county or city fire departments. Primary urban concentrations occur in the Antelope Valley, south of the base, which are provided fire protection by the Los Angeles County Fire Department and the U.S. Forest Service. The Forest Service receives federal funding, conducts its own management, and services primarily the areas close to the San Gabriel Mountains. The suburban and urban areas in the remainder of the valley are primarily served by the Consolidated Fire Protection District. There are currently 13 fire stations in the Antelope Valley, two of which (in Lancaster and Palmdale) also provide paramedical services. Current level of service is adequate to meet existing demand. In 1978, the ratio of fire-fighting personnel per 1,000 population was 1.16. This ratio includes full-time and on-call fire fighting personnel (Los Angeles County Fire Dept.).

Medical Services. A full range of medical services are available to Edwards AFB personnel on base and to regional populations near their respective places of residence. Several major medical service centers exist in the immediate vicinity of the base. The region also contains several state licensed nursing homes provided services for non-acute long-term care.

Recreation (1.2.2.3.8). Recreation resources in the Edwards AFB region are extremely diverse. In and near the cities of Lancaster and Palmdale are outdoor (parks and golf courses) and indoor (theaters and bowling alleys) facilities currently adequate to meet existing demands.

Recreation opportunities of a more rural nature include; scenic drives such as through Bouquet Canyon, 12 miles west of Palmdale; rock-hounding at Castle Buttes in the vicinity of North Edwards; remote mining museums such as Rand District, 40 miles northeast of Mojave, and many regional parts which provide picnicking, camping, and hiking, and other recreational opportunities.

Due to the proximity of the Edwards AFB region to the Los Angeles Basin, regional recreational areas are increasingly utilized year around. Current planning and zoning of land for regional recreation activities indicates the concern by county, state, and federal agencies to preserve as much land as possible to meet increasing recreational demands.

Archaeology (1.2.2.3.9). The Archaeological resources most likely to occur on Edwards Air Force Base are remains from the aboriginal occupation of this area. Many sites show only small quantities of material remains whereas others, which were occupied on a seasonal basis over a number of years, may be rather large. In addition, lake margins

are well documented as areas commonly occupied by aboriginal groups, and the potential for archaeological remains to occur in such areas is high. According to a recent overview of Antelope Valley, the area between Rogers and Rosamond Lakebeds on Edwards AFB is of relatively high archaeological sensitivity (A.D. Little, Inc., 1978).

Energy (1.2.2.3.10). Electrical energy for the entire Antelope Valley area including the Edwards AFB is supplied by the Southern California Edison Company. About 60 percent of the annual consumption on the base is allocated from the Bureau of Reclamation hydroelectric capacity, but comes to the base over Southern California Edison lines. Supply for the entire area is considered adequate for present and future needs (Edwards Air Force Base, 1976).

Water Resources (1.2.2.3.11). Groundwater is the most important source of water supply around Edwards AFB. To meet agricultural and urban needs of this part of California, the groundwater was being overdrawn principally in the Antelope Valley (mainly south of Edwards AFB) and Mojave River Basin. With the importation of Northern California water through the California Aqueduct, the overdraft situation in the Antelope Valley has been eased substantially. Two water districts, the Antelope Valley-Eastern Kern Water Agency and the Palmdale Irrigation District, distribute water obtained from the California Aqueduct to large parts of the area surrounding the project site.

Wastewater and Solid Waste Disposal (1.2.2.3.12). The Lancaster and Palmdale areas are served by Los Angeles County Sanitation Districts 14 and 20, respectively. Presently, these districts are running at 62 percent and 55 percent of their respective capacities (Los Angeles County Sanitation Distribt, 1979). Lancaster currently serves 50,000 people, and provides secondary treatment. The Palmdale facility has a reclamation program which uses plant effluent to water alfalfa fields, while district 14 waters 56-acre Apollo Park in Lancaster with water that has received tertiary treatment. At Edwards AFB all effluent is retained on base, since the low points of the valley are on the base.

Currently all solid waste in Antelope Valley is handled by private waste haulers. The valley has two landfills that are privately owned and operated, but are open for public use. On Edwards AFB there are also two sanitary landfills in operation at the present time. All of these landfills meet the requirements of and are licensed by their respective Water Quality Control Boards.

Hill AFB Existing Environment (1.2.3)

Hill Air Force Base, Utah is located seven miles south of Ogden, Utah and 23 miles north of Salt Lake City, as shown on Figure 1.2.3-1. The base furnishes logistic support for Minuteman and Titan ICBM activities and also serves as a tactical fighter center and drone test center.

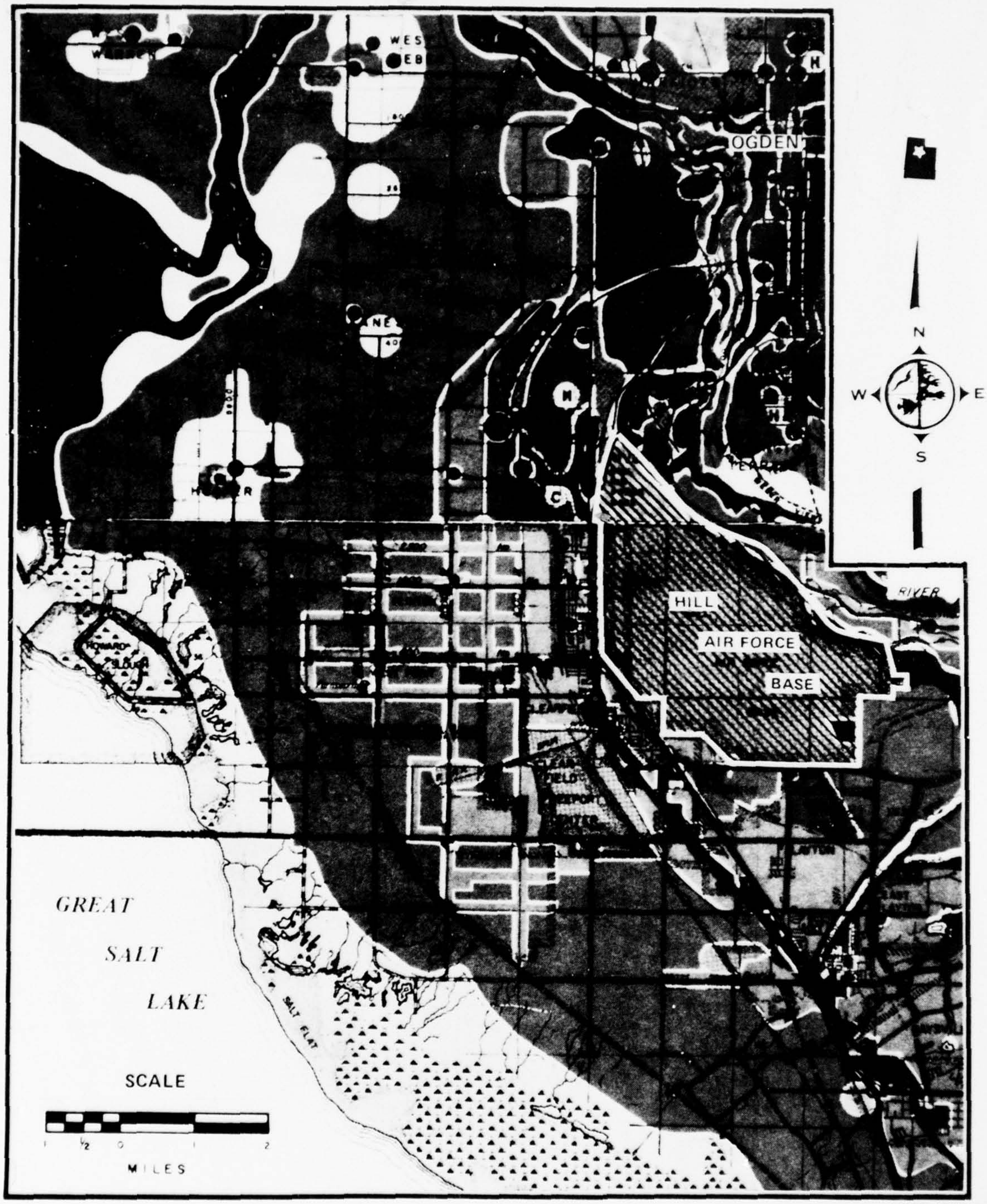


Figure 1.2.3-1. Location of Hill Air Force Base, Utah.

With approximately 4,000 military personnel and an associated 14,500 civilian employees, Hill AFB contributes approximately $164 million annually in payrolls to the local economy.

Physical Environment (1.2.3.1)

Topography (1.2.3.1.1). The area around Hill AFB has an extremely varied topography, with flat desert plains at one extreme in the west, and high snow-capped mountains at the other extreme in the east. The northern half of the Great Salt Lake Desert west of the Great Salt Lake is classified as smooth plains with local relief varying from 100 to 200 feet (30 to 65 m). Northwest of the Great Salt Lake Desert, the land surface changes to plains with low mountains, and to the northeast of the desert and long the eastern shore of the Great Salt Lake, the topography changes to plains with mountains exceeding 3,000 feet (1,000 m). The easternmost part of the area contains a portion of the north-south tending Wasatch Mountains. The northern portion of the Wasatch Mountains are classified as open high mountains. The average elevation of the area is approximately 6,562 feet (2,000 m), varying from a low of 4,193 feet (1,247 m) on the surface of the Great Sale Lake, to a high point of 11,330 feet (3,440 m) atop Twin Peaks. High AFB, near the Great Salt Lake, has an elevation of 4,788 feet.

Geology (1.2.3.1.2). Exposed bedrock in the region consists of old (paleozoic) sedimentary, metamorphic and some granitic rocks. The west side of the Wasatch Range is a fault scarp; other faults are also present. Hill Air Force Base is on alluvial and terrace deposits. The area is not seismically active.

Hydrology (1.2.3.1.3). The Salt Lake Region receives about 13 inch (330 mm) of annual precipitation. Surface runoff averages less than 2 inch (50 mm) of precipitation per year; peak runoff typically occurs in March. The water supply for Hill AFB and neighboring communities chiefly comes from the Wasatch Mountains east of the region. Surface water is predominantly hard with concentrations of calcium and magnesium bicarbonate in excess of 120 ppm. Local groundwater has high concentrations of sodium/pottasium sulfate/chlorides exceeding 1,000 ppm. All low-lying areas away from the mountains are so saline as to be useless.

Meteorology and Air Quality (1.2.3.1.4). The major local influence affecting climate for the Salt Lake Valley is the Wasatch Front, which forms a protective barrier from the arctic air masses approaching from the north and northeast. The inland position and high altitude of the region produce a semiarid continental climate with well-defined seasons. Summers are generally hot and dry with average daily temperatures ranging from 60 to 93 degrees F (15 degree and 33 degree C) in July. The generally low relative humidity helps to make summer weather quite pleasant. The summers are very dry: average July precipitation at Salt Lake City

is only 0.7 inch (17 mm). In winter, the mean January daily range is from 18 degrees to 37 degrees F (-8 degrees to 3 degrees C). Winters are usually not severe due to the combined effect of mountain ranges to the north and east, which act as barriers to cold continental air masses. Average precipitation in Salt Lake City for the month of January is 1.3 inch (33 mm); total snowfall is 35.6 in. (904 mm) equivalent to about 3.5 inch (90 mm) of rainfall.

Hill AFB falls within the Wasatch Front Air Quality Control Region (AQCR No. 220). Annual particulate monitoring data from available air quality monitoring sites, which are considered representative of Hill AFB, are presented in Table 1.2.3.1.4-1.

For the purpose of comparison, Salt Lake City is included in the table as a downwind site. The number of daily values which exceed the 24 hour primary standards, range from no exceedences in Bountiful to 8 in Salt Lake City.

Table 1.2.3.1.4-2 presents the annual sulfur dioxide montoring data. The annual number of daily values which exceed the 24-hour standard range from no exceedences in Bountiful and Ogden to one day in Salt Lake City. The annual arithmetic mean ranges from 25 ug/m^3 in Bountiful to 28 ug/m^3 in Ogden.

From these data it is apparent that the Hill AFB area has an air pollution problem in terms of the state and national air quality standards.

<u>Biological Setting</u> (1.2.3.2)

Hill AFB is located in the Neddlegrass-Antelope Biome characterized by bunch grasses and oak bush and woodland typical of the alluvial fans and foothills of the Wasatch Mountains. In the region surrounding the base, environmental stresses imposed by dry climate, low-elevation salty soils, and high-altitude cold temperatures limit lifeform densities everywhere in the region, and small changes in soil or elevation from place to place are reflected in major changes in species composition and vigor.

<u>Socioeconomic Setting</u> (1.2.3.3)

In 1972, the Salt Lake region, with Hill AFB in its center, has 979 industrial establishments comprising 72.1 percent of all industrial firms in the state. Similarly, the region employed 74.6 percent of all industrial firms in the state. Similarly, the region employed 74.6 percent of all industrial workers and generated 71.0 percent of the total value added by manufacturers in the state.

Table 1.2.3.1.4-1. Annual particulate monitoring data.

STATION	NUMBER OF VALID VALUES	NUMBER OF DAILY VALUES EXCEEDING 24 HR PRIMARY STANDARDS	HIGHEST 24 HR VALUE ($\mu g/m^3$)		ANNUAL GEOMETRIC MEAN ($\mu g/m^3$)
			FIRST	SECOND	
Bountiful	216	0	198	194	50
Ogden	299	5	437	345	81
Salt Lake City	352	8	691	349	82

Table 1.2.3.1.4-2. Annual sulful dioxide monitoring data.

STATION	NUMBER OF VALID VALUES	NUMBER OF DAILY VALUES EXCEEDING 24 HR PRIMARY STANDARDS	HIGHEST 24 HR VALUE ($\mu g/m^3$)		ANNUAL GEOMETRIC MEAN ($\mu g/m^3$)
			FIRST	SECOND	
Bountiful	7,136	0	316	264	25
Ogden	7,187	0	266	225	28
Salt Lake City	5,459	1	412	291	—

Population (1.2.3.3.1). Testing activities at Hill AFB are expected to have impacts concentrated within the Ogden/Salt Lake City area. Table 1.2.3.3.1-1 lists regional populations, and Utah's population for 1965 and 1975, and projections for 1980 and 1990. In 1965, the region's share was two-thirds of the state's total population.

Population trends are depicted as annual rates of growth. The region's 1965 to 1975 annual population growth rates do not indicate any significant trend.

Employment (1.2.3.3.2). The percentage distribution of employed persons by occupations for the Salt Lake City Region, for Utah, and for the Nation in 1970 are presented in Table 1.2.3.3.2-1. The relatively high proportion of workers in the professional and technical category to total workers in the region was higher than the state or national averages. The concentration of white collar professionals and blue collar skilled craftsmen in the region provides a good base for the expansion of industries and associated businesses in the metropolitan area.

In keeping with the national and state unemployment trends, Salt Lake Region showed a sharp increase in the unemployment rate between 1974 and 1975, when it increased from 2.8 to 7.4 percent. This was, however, below the national increase where the rate jumped from 5.6 percent in 1974 to 8.5 percent in 1975.

Income (1.2.3.3.3). Table 1.2.3.3.3-1 indicates that the region's average annual rate of growth in personal income has been 3.1 percent in 1967 dollars. Utah's annual growth was 2.8 percent for the same period.

Housing (1.2.3.3.4). Table 1.2.3.3.4-1 presents 1960 and 1970 housing data. From 1960 to 1970, supply increased at an annual average rate of 3.1 percent such that by 1970, 209,900 dwellings were available. In terms of aggregates, this region's housing supply was relatively small and its growth moderate.

Single family housing growth was modest: only 30,400 additional dwellings were supplied over this 10 year period. Aggregate supply of single family units was 154,800 dwellings in 1970. Single family units' share of total housing declined over time, from 1960's 80.8 percent to 73.7 percent of the total number of dwellings in 1970. The Ogden metropolitan area lies immediately north of Hill AFB. In 1978, this area had a total of about 17,000 units, 6 percent of which were reported vacant. The average rental in the area was reported at $260 per month, and the selling price of single family homes was about $48,000 (Ogden Board of Realtors).

Energy Resources (1.2.3.3.5). Electric power to the HILL AFB and the Salt Lake region is supplied by the Utah Power and Light Company. Natural gas is provided by the Mountain Fuel Supply Company. Both companies consider supplies to be adequate for the foreseeable future.

Table 1.2.3.3.1-1. Historic and projected population, Salt-Lake Region.

YEAR	POPULATIONS (000)		ANNUAL PERCENT GROWTH	
	REGION	STATE	REGION	STATE
1965	670.8	991.0	—	—
1966	683.5	1,009.0	1.9	1.8
1967	689.9	1,019.0	0.9	1.0
1968	695.7	1,029.0	0.8	1.0
1969	705.1	1,047.0	1.4	1.7
1970	716.0	1,066.0	1.5	1.8
1971	733.3	1,094.0	2.4	2.6
1972	749.7	1,127.4	2.2	3.1
1973	760.4	1,150.2	1.4	2.0
1974	775.3	1,178.7	2.0	2.4
1975	790.0	1,205.9	1.9	2.3
1980[1]	776.1[2]	1,160.1		
1990[1]	876.1[2]	1,309.6		
1965 to 1975			1.6	2.0
1975 to 1980			-0.4	-0.8
1980 to 1990			1.2	1.2

[1] Projected populations.

[2] These entries are estimates since no actual projected population figures are given for the Salt Lake-Ogden economic region. These entries have been calculated by finding the region's average share between 1965 and 1975 of Utah's total population, which is 66.9 percent. This percentage is multiplied by Utah's projected 1980 and 1990 population, giving the region's estimated population.

Sources: U.S. Department of Commerce; Bureau of Economic Analysis, Regional Economics Information System; Area Economic Projections, 1990.

Table 1.2.3.3.2-1. Occupational distribution of employed persons, Salt Lake region, 1970.

OCCUPATION	PERCENT OF TOTAL WORKERS, 1970		
	REGION	STATE	NATION
White Collar Workers	55.3	51.9	48.3
Professional and Technical	17.7	17.2	14.2
Managers and Administrators	9.5	9.2	10.2
Sales Workers	7.7	7.0	6.2
Clerical Workers	20.4	18.4	17.4
Blue Collar Workers	31.3	32.3	35.3
Craftsmen and Foremen	14.6	14.5	12.9
Nontransport Operatives	8.9	9.8	13.7
Transport Operatives	3.8	3.7	4.0
Nonfarm Laborers	4.0	4.3	4.7
Other Workers	13.4	15.8	15.4
Agricultural Workers	1.3	3.1	4.0
Service Workers	11.4	13.0	10.9
Private Household Workers	0.7	0.7	1.5
Total Workers	100.0	100.0	100.0

Sources: U.S. Department of Commerce, Bureau of Census, 1970 Census of Population.

Table 1.2.3.3.3-1. Per capita income, Salt Lake region, 1965, 1970, and 1975.

YEAR	POPULATION (IN THOUSANDS)		PER CAPITA INCOME			
			CURRENT DOLLARS		1967 DOLLARS(1)	
	REGION	STATE	REGION	STATE	REGION	STATE
1965	670.8	991.0	2,446	2,390	2,588	2,529
1970	716.0	1,066.0	3,360	3,227	2,889	2,775
1975	780.0	1,205.9	5,192	4,938	3,515	3,343
Annual Average Percent Growth 1965 to 1975	1.6	2.0	7.8	7.5	3.1	2.8

(1) The purchasing power of a dollar of any specific year expressed in terms of the purchasing power of 1967 dollars.

Source: U.S. Department of Commerce, Bureau of Economic Analysis

Table 1.2.3.3.4-1. Housing inventory by type of structure, Salt Lake-Ogden Region, 1960 and 1970.

TYPE OF STRUCTURE		1960	1970	AVERAGE ANNUAL PERCENT GROWTH 1960 TO 1970
Single Family	Number	124,400	154,800	2.2
	Percent of Total	80.8	73.7	
Multi-Family	Number	29,600	55,100	6.4
	Percent of Total	19.2	26.3	
Total Units		154,000	209,900	3.1

Sources: U.S. Department of Commerce, Bureau of the Census, 1962; U.S. Department of Commerce, Buresu of Census, 1973a.

2. RELATIONSHIP OF AIRCRAFT AND MISSILE FLIGHT TESTING TO LAND-USE PLANS, POLICIES, AND CONTROLS FOR THE AFFECTED AREA

2.1 VANDENBERG AFB

Existing Land Use Patterns (2.1.1)

Land use at Vandenberg is similar to that of its environs with extensive open space in a predominantly rural setting. Military land uses on the base include launch areas, technical support areas, and base support areas. The major non-military uses of the base are for recreation, grazing, and farming.

Existing Land-Use Plans and Policies (2.1.2)

The major regulators of future development in Santa Barbara County are existing general plans and zoning. The general plans of Santa Barbara County and the city of Santa Maria are currently being revised. It is anticipated that a policy of more moderate growth will be developed in these revised General Plans. Detailed land use on Vandenberg is described in the FEIS, Volume III.

Proposed Actions Affecting Land Use (2.1.3)

There are two major proposed actions that may affect land use on Vandenberg and its environs. The first is the Space Shuttle Program at VAFB. The second is the possible combination of a liquified natural gas (LNG) terminal near Point Conception to the south of Vandenberg. These proposed actions are discussed in Volume III of the FEIS.

2.2 EDWARDS AIR FORCE BASE

Existing Land Use Patterns (2.2.1)

Major attention in this section is focused upon the area of residence of the majority of Edwards AFB employees — the Antelope Valley, directly south of the base. The primary urban centers within the valley are Palmdale and Lancaster and the more rural community of Quartz Hill.

Most of the land to the north and east of Edwards AFB is characteristically desert, with some urban or agricultural development within 25 miles. The land is classified as resource reserve, a land use classification similar to that of open space reserve by other planning agencies.

Boron, the community nearest the base, is primarily a residential area for employees of U.S. Borax, the town's primary industry. The community of North Edwards consists almost entirely of active and retired military personnel. Only 5 percent of the community is zoned commercial, the remainder residential. The small town of Mojave is a place of residence for employees of the Southern Pacific Railroad Company. California City, mainly a planned retirement community, immediately north of the base, houses a small contingent of Edwards AFB employees and provides a full range of community services.

West of the base is the town of Rosamond. The principal industries in the area are Great Lakes Carbon, a carbon processing plant, and tourist traffic along the Sierra Highway, which has caused a minor strip commercial development in the community.

The Palmdale/Lancaster area has received the major portion of residential, commercial, and industrial growth in the Antelope Valley. The existing land use pattern in Palmdale is characterized by residential and commercial tracts scattered along either side of Palmdale Boulevard, one of the city's major arterials. Other smaller commercial centers are dispersed throughout the community, adjacent to residential tracts. U.S. Air Force Plant 42 is in the eastern portion of the city. Major industrial land users include aerospace-related companies such as Lockheed and Rockwell International. Further east is the site of the proposed Palmdale International Airport which is projected to be operational in 1995. The Palmdale General Plan and current zoning has provided for a large industrial buffer zone surrounding the airport.

Lancaster has residential, industrial, and commercial uses concentrated in separate areas. The other residential areas are aligned along the Sierra Highway.

Current zoning in both Palmdale and Lancaster approximates existing land use development. Apparent, however, is the abundance of land available for future urban expansion in all land use zoning classifications, with perhaps the exception of recreational areas in Palmdale. Proposed development of the Palmdale International Airport is projected to induce population in-migration in the two city area and rural Quartz Hill, immediately north.

All lands on the base are administered by the U.S. Air Force. Other users include the National Aeronautics and Space Administration (NASA), and part-time users engaged in various phases of aerospace research, development, and testing.

Base land use consists of a base housing and support services area, test sites, transportation network, and a large area of undeveloped open space (see Figure 1-2). The base provides a full range of services for resident personnel.

Base operations are carried out primarily in four areas, with most activity concentrated at two complexes on Rogers Dry Lake in the central portion of Edwards AFB. These two areas are Auxiliary Test Site No. 2, designated as North Base, located on the west central fringe of the lake. Both complexes include extended runways which traverse the lake. Auxiliary Test Site No. 4 is located on Buckhorn (dry) lake, 6 miles (10 km) southwest of the main base. The last area is Auxiliary Test Site No. 1, located 14 miles (23 km) east of main base. All auxiliary test sites are utilized for various stages of aerospace-related research, development, testing, and evaluation. Additionally, the Precision Instrument Range (PIRA) is located in the southeastern portion of Edwards AFB. PIRA is used primarily, but not exclusively, by the DoD and NASA as a test range. However, the size of the range is limited, restricting the types of testing operations which can be conducted.

Due to the restrictive nature of base operations, no public land uses have been or are expected to be allowed on-base. This includes agriculture, recreation, or any other type of land use. Even within a 10 mile (16 km) perimeter around the base boundaries, land use is limited almost exclusively to open space with the exception of highways, roads, and small urban areas.

Existing Land Use Plans and Policies (2.2.2)

Although a comprehensive general plan has not been adopted for the Antelope Valley, current zoning patterns of county rural and urban lands indicates adequate provision for residential, commercial, and industrial expansion where feasible. This pattern is also evident in Palmdale and Lancaster, though as incorporated cities they are not subject to county land use plans and zoning.

Proposed Actions Affecting Land Use (2.2.3)

In addition to existing planning policies and regulations in the Antelope Valley, a major proposed action which may also affect land use is the Palmdale International Airport (PIA). The Los Angeles Department of Airports proposes to construct the major commercial airport facility adjacent to the City of Palmdale and an existing 5,700 acre U.S. Air Force facility known as Plant 42. Construction of the Palmdale International Airport is expected to occur from 1980-1990, with full operations to begin in 1995.

2.3 HILL AIR FORCE BASE

Existing Land Use Patterns (2.3.1)

The region surrounding Hill AFB has a total land area of 7,245 sq. mi. or 4.6 million acres. Most of this land is occupied by agriculture and other nonurban uses. Only 137,000 acres or 3 percent of the land is urbanized. Almost all of the urban development in the region is located along the Interstate 15 axis, from metropolitan Salt Lake City in the south to Brigham City in the north. Salt Lake City, with a population of 172,000 in 1970, is the largest city of this urban region. Other urban centers are Ogden, Bountiful, Millcreek, Murray, Holladay, Roy, Clearfield and Layton.

Of the total land under urban uses in the Salt Lake region, 35 percent is devoted to residential land use. Industrial uses occupy 13 percent and commercial uses 5 percent of the urban land, while the remaining is occupied by "other" land uses such as transportation, utilities, public institutions, and parks and recreation areas. Industrial land in the region is concentrated in nine major industrial parks conveniently located close to major rail and thoroughfare routes and spread between Salt Lake City and Ogden.

Existing Land Use Plans and Policies (2.3.2)

The coordination of land use policies and plans in the region is provided by the Wasatch Front Regional Council, which is a voluntary association of local governments for the five counties of Salt Lake, Davis, Weber, Morgan, and Tooele. Information obtained from this agency on the area of interest indicates that all local governments in the region are in favor of further population and economic growth, especially industrial growth. While due consideration for environmental factors, e.g., water supply and water and air quality, in the region is given in the process of planning, growth is encouraged by local as well as state government actions. Wasatch Front Regional Council, in 1976, estimated that 3,158 acres of land were occupied by industrial parks developed by both private enterprise and by the individual communities or counties (WFRC, 1977a). Very little land is presently occupied by industries in these well-equipped and fully-serviced parks.

According to the figures provided by the Wasatch Front Regional Council, about 62,000 acres of nonurban land in the region will be converted to urban uses by 1995, increasing the urbanized area by almost 50 percent. Most of this land will be occupied by residential and other land uses serving the expected population growth. As indicated earlier, sufficient land has already been earmarked for industrial purposes and is not being fully utilized. Still, an additional 3,500 acres of land is expected to be added to the present inventory.

Proposed Actions Affecting Land Use (2.3.3)

Proposed base land use for the MX assembly building would be minimal (probably less than 1/2 acre). There would be no conflict with the base master plan.

3. ENVIRONMENTAL IMPACTS

3.1 VANDENBERG AFB AND ENVIRONS

Construction (3.1.1)

Physical Impacts (3.1.1.1)

Negligible disturbances of local soils, topography, and drainage are likely to result from road and building construction at Vandenberg AFB. The nature of any such impacts would be the same as detailed in the FEIS. The impacts on air quality of the minor amount of construction anticipated would be short term, site specific, and minimal.

Biological Impacts (3.1.1.2)

Construction activities that could impact the biological environment are limited to possible road modifications for access to the Shuman Canyon launch site. The area is predominantly grasslands. Loss of habitat would be minor.

Socioeconomic Impacts (3.1.1.3)

The potential socioeconomic impacts at Vandenberg AFB will be considerably less than those discussed in the Milestone II FEIS (Vol III-Missile Flight Testing). Construction costs for MPS were estimated at approximately $50 million. Air Mobile construction costs are anticipated to be in the $5 million range. Manpower requirements (approximately 80 workers) could be filled from the local labor pool with no importation of workers required, depending upon the extent and timing of Space Shuttle construction. The potential impacts of labor importation, if any, were discussed in the Milestone II FEIS.

Additional expenditures for the period on materials and construction personnel could temporarily stimulate regional sales but the impacts are not projected to be substantial and no population growth or associated impacts upon infra-structure are anticipated. The housing market would not be affected, and transportation would involve a slight and imperceptible increase in traffic in the Vandenberg environs for the construction months. Construction would increase energy use, but the increment would be negligible in regional terms. Land use changes would be only those involved in the activities onbase.

Archaeological Impacts (3.1.1.4)

Road construction, if required, could potentially impact a known multiple activity site on the north side of Shuman Canyon, but should be avoidable by proper alignment. It is unlikely that modifications to existing Minuteman launch facilities would have any effect on archaeological resources. These areas have already been disturbed, and neither Spane's (1971, 1973) survey nor a reconnaissance survey conducted in conjunction with the Milestone II studies discovered any archaeological remains.

Operations (3.1.2)

Physical Impacts (3.1.2.1)

Noise Impact (Vandenberg) (3.1.2.1.1). Noise from air operations and test firings is not expected to produce a perceptible impact at Vandenberg AFB or its environs. There will be three ground launches: the FEIS indicated negligible impacts from 20 launches of a similar missile. Air operations in which test aircraft land to acquire vehicle test packages, and then depart for air launches over adjacent ocean waters 20 miles distant or more may occur, however. Current operations include C-5 aircraft; any of the candidate aircraft are expected to be quieter than this aircraft, and to peak infrequently.

Propellent emissions from the planned ground launches to be conducted in the existing Minuteman launch area are expected to be similar in type and quantity to those produced by ongoing test programs. The detailed analysis in Volume III, Section 3.2 of the FEIS adequately addressed this aspect of the air mobile program.

The projected air launches 20 to 50 miles at the western test range off the coast west of Vandenberg are not expected to generate any surface air quality impacts. Analysis of the potential upper atmosphere effects of rocket engine exhaust constituents is addressed in the FEIS.

The present and expected population changes from other programs (see FEIS Volume II) are not large and will have little effect on air quality. Emissions other than those related to traffic are low and constitute less than 0.1 percent of the area pollutant load. Impacts from such a small overall contribution are not identifiable.

Biological Impacts (3.1.2.2)

The potential biological impacts associated with air mobile testing at Vandenberg primarily are related to noise. Approximately three ground launches of the missile would take place, probably at Minuteman launch facilities just north of Shuman Canyon. Potential impacts of these tests would be lower than for the launches at the Shuman Canyon site discussed in Volume II of the FEIS since the number of launches would be considerably smaller. Federally protected least tern colonies are 5 to 8 miles south of the proposed test site and are not expected to be impacted by the ground launch tests.

The 15 to 20 launch tests to be conducted 20 to 50 miles (32 to 80 km) west of Vandenberg AFB at the Western Test Range are expected to have negligible biological impacts. These tests will originate approximately 50 to 80 miles northwest of the Channel Islands and will be launched in a westerly direction. No impact upon San Miguel Island or any other Channel Island would occur. The air launch tests would be far enough offshore to preclude any potentila impacts upon migrating grey whales.

Socioeconomic Impacts (3.1.2.3)

The socioeconomic impacts associated with air mobile MX testing at Vandenberg AFB will be considerably less than the impacts associated with MPS testing.

Compared to the estimated cost of $350 million and upwards (over several years) and 580 permanent personnel required for MPS testing, the air mobile test program costs and manpower requirements would result in a substantial reduction. Operational impacts would be largely at Edwards. Labor requirements could probably be met by existing personnel at VAFB and any indirect jobs that would be created could be filled by the region's local labor pool. Concurrent Space Shuttle activities at VAFB may affect these local labor use assumptions. Should some outside labor be required for the air mobile operations at Vandenberg, the resultant induced growth would be too negligible to be projected.

Archaeology (3.1.2.4)

No impacts to archaeological resources are anticipated.

3.2 EDWARDS AFB AND ENVIRONS

Construction (3.2.1)

Physical Impacts (3.2.1.1)

Topography (3.2.1.1.1). Up to 3 acres may be disturbed within the existing built-up area of Edwards, representing an increase of less than 1 percent. The uniformly level and stable nature of the terrain results in very low sensitivity to construction, and project implementation will therefore have negligible topographic impact.

Air Quality (3.2.1.1.2). Construction of a missile assembly building at Edwards AFB has a very low potential for impact on air quality. Construction would presumably take place near the area occupied by the runway and other existing test facilities. No new areas would be disturbed and construction time would be less than one year. Any dust, noise, vehicle emissions or possible traffic delays would be integrated with and occur in the context of ongoing activities. Vehicle emissions from the small construction force (less than 50 people) are projected to be less than the normal daily variations that occur in the traffic to and from the base.

Biological Impacts (3.2.1.2)

Construction of test facilities are not expected to impact the rare Mojave ground squirrel since it is not very common in the area, not the protected golden eagle which may or may not occur on the base.

Socioeconomic Impacts (3.2.1.3)

Population (3.2.1.3.1). As no worker importation is determined to be necessary (Section 3.2.1.3.2), there are no anticipated population impacts associated with construction activities at Edwards AFB.

Employment (3.2.1.3.2). Construction activity associated with air mobile testing located at Edwards AFB is basically limited to construction of not more than a 12,000 ft^2 Missile Assembly Building in approximately mid-1980 to mid-1981. Aircraft related test facilities already exist at Edwards and with minor modification should be available for air mobile MX-related flight tests. Given estimated square footage costs developed for similar missile assembly building construction at Vandenberg AFB (Volume III, FEIS), the cost of a 12,000 ft^2 Missile Assembly Building at Edwards AFB is estimated at $3,264,000 in 1977 dollars. This construction work force of about 36 workers.

Indirect employment opportunities in the support industries and service sectors were estimated using the RIMS procedure and are estimated at 211 workers with earnings of approximately $2,845,000 in 1977 dollars. The total change in employment due to construction activities is therefore estimated at 247 jobs or less than one-half percent of the total employment projected for 1982 in the Edward AFB sphere of influence. The total increase in earnings of $3.76 million will be distributed throughout the region with the majority of the distribution in the Lancaster and the Palmdale areas. The unemployed labor pool in the Edwards AFB sphere of influence is estimated at 5,167 people. This labor pool is considered sufficiently large enough to accommodate the increased labor demand and ers is expected.

The test program at Edwards AFB may coincide with the start of construction of the proposed Palmdale International Airport (PIA). The proposed PIA is estimated to require approximately 821 construction personnel over the years 1980-1990. Together with the indirect effects of this project there is the possibility that cumulative effects may result in growth related impacts in the region. Discussion of the impacts associated with construction and operation of the PIA can be found in the PIA FEIS (1978).

Housing (3.2.1.3.3). As no worker importation is determined to be necessary (3.2.1.3.2), there will be no housing impacts associated with construction activities at Edwards AFB.

Transportation (3.2.1.3.4). There will be a slight increase in transportation activity in and around Edwards AFB, primarily related to material transport and workers commuting to the base from these residences, however, these activities are determined to be negligible relative to current and projected transportation activities in the area.

Archaeology (3.2.1.3.5). Due to the high degree of previous disturbance in the proposed construction area and the small surface area that will be disturbed, it is unlikely that there will be major impacts on archaeological resources. Final siting will avoid known archaeological sites.

Operations (3.2.2)

Physical Impacts (3.2.2.1)

Noise Impacts (3.2.2.1.1). Based on Edwards AFB TAB-A-1, Environmental Narrative, the average numbers of daily takeoff and landing are about 135 for small aircraft and four for large aircraft (large aircraft are C-5 or C-135, and B-52). Average daily touch-and-go operations are about 96 times a day. It is estimated that the flight test mission for the air mobile test aircraft will not exceed two operations in a typical day, which would have a minimal impact on existing aircraft noise levels.

Air Quality Impacts (3.2.2.1.2). The emissions from fuel burned by a nominal flight test program for air mobile are estimated to be about 10 to 15 percent of the annual baseline and would therefore range from 126 to 189 tons of CO, 63 to 95 tons of NO_x and 53 to 79 tons of HC. Since these figures were deliberately chosen to maximize the potential emissions, there is a considerable likelihood that the emissions level from air mobile flight tests will be much less on an average basis.

The above emission levels represent a small fraction of the existing total emissions within Kern County, less than 0.5 percent, and an even smaller fraction of the total emissions in San Bernardino or Los Angeles counties. If we assume that the Edwards AFB area (i.e., Antelope Valley) contains about 15 percent of the Kern County emissions then the air mobile emissions are projected to be between 1.0 and 3.5 percent of the Antelope Valley emissions.

Visibility reductions due to transport into the area of pollutants from Los Angeles are suspected to be larger than potential reductions due to the low level of emissions associated with this program. The relatively strong diurnal winds, thermal mixing and high dilution capability of the dry desert atmosphere reduce even further the expectations of causing measurable area wide impacts from a program such as the air mobile flight tests. The current visibility study should assist in providing confirmation of this expectation during its extended period of data collection.

The number of people that could be associated with the air mobile flight test program totals between 800 and 1,300 including military personnel, their dependents and some influx of people in commercial

enterprises. This represents 1 percent or less of the Antelope Valley population. If a total of 1,300 people were added to the present population, the potential increase in emissions (based on the Kern County per capita average) would be approximately double the estimated emissions increase due to the aircraft in the flight test program. This places the maximum potential total pollution increase at 2 to 7 percent of present emissions levels.

In the Antelope Valley communities of Palmdale, Lancaster, Boron, Majave, Rosamond, and Edwards AFB, the population related emissions increase will have little effect on the pollutant concentrations now monitored. A potential for visibility degradation exists with any population increase. Specific effects may be identifiable as a result of long term monitoring, but present indications are that a population increase of 1,300 people will not cause a detectable change in either air quality or visibility.

Biological Impacts (3.2.2.2)

Biological impacts resulting from flight and associated testing are predicted to be negligible. The potential impacts of air dropping 45 to 50 loads ranging from 10,000 to 160,000 lbs (4,500 to 72,700 kg) on the test range are expected to be minimial since the test range is routinely used for similar activities.

The effects of aircraft noise on wildlife during air mobile flight tests at Edwards AFB are expected to be negligible. Studies and observations of aircraft noise effects on wildlife generally indicate that animals may exhibit a startle response but usually adapt to the noise if it occurs frequently. Thus, since Edwards AFB is an operating flight test facility, wildlife in the area would be expected to be adapted to the noise, and increasing the frequency should not cause any adverse effects.

Socioeconomic Impacts (3.2.2.3)

Population (3.2.2.3.1). To estimate population effects from employment effects, the following assumptions have been used:

- 80 percent of the air mobile related direct jobs will require worker importation
- Indirect jobs will be filled entirely by local residents
- New jobs requiring in-migration of workers are converted into population by using a factor of 2.32 people per job which is appropriate for California (1980-1985).

Thus, expected population in-migration during the early stages of activation and testing is estimated at 920 people. This is an expected increase of less than 0.5 percent of the area's population in 1982. The impact of this growth will be felt differently in the various subareas of the sphere of influence. Due to the proximity and size of the available housing supply and shopping centers in the Lancaster/Palmdale area, the majority of the increased population is expected to reside in this area with relatively few people residing in the outlying areas of Barstow, Victorville, and Indian Springs Valley.

Employment (3.2.2.3.2). The air mobile flight test program at Edwards AFB would involve approximately 300-500 people over a time span of approximately five years from mid-1981 to mid-1986.

Assuming a "worst-case" analysis, direct employment of 500 persons will lead to direct earnings of $10 million per year (assuming an average salary of $20,000 per man-year). Over the life span of the project $50 million in direct earnings is expected to accrue to residents of the area.

Indirect employment opportunities generated by the test activity is estimated at 297 jobs with earnings of $4.02 million in 1977 dollars using the RIMS-generated PCE multiplier for the Los Angeles region (2.775). The total increase in employment opportunities is therefore estimated at 797 jobs with earnings of $14.02 million per year in 1977 dollars. Because of the larger work force associated with testing, the distribution of earnings will be more widespread and a greater percentage will accrue to communities around Barstow and Victorville. The total increase in proximately 1.3 percent of the projected 1982 employment of 61,235. As test activities end in approximately mid-1986, there will be an expected drop in regional employment at that time; however, regional expenditures expected through 1986 will serve as incentivies for investment in the economic base of the region that will be beneficial beyond deactivation of the testing program.

Housing (3.2.2.3.3). As the majority of the increased population is expected to locate in the Antelope Valley area, discussion of the housing market will be restricted to that area.

The housing supply in the Antelope Valley area increased at an annual average rate of approximately 4.0 percent between 1970 and 1974. The projected vacancy rate for 1982 is estimated to be approximately 2.1 percent based on the vacancy rate for Lancaster in 1976. The supply of housing in 1974 stood at approximately 28,700 (North Los Angeles County General Plan, 1974) and assuming an annual average rate of growth the same as experienced in the 1970-1974 period the expected housing supply in 1982 is estimated at 39,300 units. Thus, projected vacant housing stock available in 1982 is estimated at 825 units.

The expected increase in demand for dwelling units in the area has been determined by assuming an average household size of 2.7 people. Population in-migration of 930 people will therefore require approximately 350 units. Thus, the vacant housing stock appears marginally adequate to accommodate the increased demand for housing due to the air mobile test program activities at Edwards AFB, but is subject to substantial uncertainty.

Land Use (3.2.2.3.4). The Antelope Valley originally developed as principally an agricultural area. Since the 1950s, however, there has been a steady diversification in land use to include industrial, commercial, and residential uses. As evidence of this trend, total agricultural acreage has declined from 173,642 acres in 1960 to 79,168 acres in 1972 and vacant land has decreased from 1,302,679 acres to 772,610 acres over the same period of time (see Section 3.2.1.3.2). General plans for the Lancaster and Palmdale areas have set aside abundant land for future urban expansion in all land-use classifications with the exception of recreational areas in Palmdale.

Test activities at Edwards AFB and the subsequent indirect impacts associated with expansion of the urban area will not severely limit exploitation of the industrial, commercial, and residential reserves by increased economic activity of other businesses and industries.

Energy (3.2.2.3.5). Energy requirements (for electrical power and petroleum, oil, and lubricants) for missile system flight tests at Edwards AFB are extremely small compared to resources available. During construction of a portion of Edwards AFB to support testing, power demand is estimated to be 1.65 megawatts (MW), assuming a one-year construction cost of $6 million and a demand factor of 0.275 MW/$1 million/year. This compares with a projected Western States Coordination Council (WSCC) power-pool reserve margin of 14,865 MW for 1981.

During flight testing from mid-1981 to mid-1986 electric power demand is estimated to 1.4 MW for 500 base personnel (civilian and military) at a demand factor of 2.8 kilowatts (KW)/base person. The WSCC reserve margin would be 20,362 MW by National Electrical Reliability Council projects and 6,952 MW by Federal Power Commission projections for 1986 that account for construction delays or cancellation of nuclear plant capability. There would be no induced population to generate additional demand.

Petroleum, oil, and lubricants (POL) requirements would be negligible during construction/modification at Edwards AFB. During flight testing a minimum of 45 to 50 air drops of dummy loads are planned. Assuming an equal number of flights for aircraft performance and all weather testing, POL (essentially jet fuel) requirements are estimated to be approximately 7,000 tons for AMSTs and 13,000 tons for WBJs over the

five year program (1,400 to 2,6-0 tons/year), based on an average 6-hour duration and 8 to 15 tons/hour of fuel consumption. If crew flight training were included in POL requirements and one crew were assigned to each of the three operational aircraft (two aircraft are scheduled for static and fatigue testing), additional training requirements are estimated to be 15,000 to 28,000 tons for one year. Total requirements of 16,400 to 30,600 tons in the training year and 1400 to 2600 tons per year during the remaining four years would be a negligible proportion of the 44.7 million tons of jet fuel expected to be produced yearly in the United States during the 1981-86 period.

Education (3.2.2.3.6). School districts potentially affected by increased population in the area are the Lancaster and Palmdale Elementary School Districts and the Antelope Valley Union School District. The educational systems in the Antelope Valley area appear to be adequate (North Los Angeles County General Plan 1978) and the District's average class size is slightly below the state-wide average of 26.5 students per class. Assuming approximately 0.7 school-age childern per household, the resulting increase in average daily enrollment would be about 240 students. This would increase the average daily attendance of the affected school districts by approximately 1.3 percent. Adequate financing of the districts is reported (North Los Angeles County General Plan, 1978) and this increase is not expected to create any adverse impacts on the overall quality of nd in the area.

Archaeology (3.2.2.3.7). No impacts to archaeological resources are anticipated during the test phase of this project at Edwards AFB.

3.3 HILL AIR FORCE BASE ENVIRONS

Construction (3.3.1)

Physical Impacts (3.3.1.1)

Construction of the missile building at Hill AFB is not expected to have significant impacts on topography. Adequate areas of reasonably level land are available for this purpose.

Construction of a relatively small building would not be expected to result in any noise related impacts.

Air quality is not expected to be degraded in the region as a result of the construction activities because no in-migrating personnel are expected, the work force is small, and only relatively small amounts of fuel would be required for operation of construction equipment and worker-commuting traffic.

Biological Impacts (3.3.1.2)

Construction of the missile assembly facility at Hill AFB is not expected to have significant biological impacts.

Socioeconomic Impacts (3.3.1.3)

The air mobile assembly assembly facility at Hill AFB would be comprised of a 12,000 ft^2 Missile Building in the mid-1981 to mid-1982 time frame. Associated roadways and related facilities would result in an investment of approximately $3.5 million in 1977 dollars. This will result in a construction work force of about 40 persons. The total regional increase in earnings during construction would be approximately $2.1 million and the associated increase in output for the region is estimated to be $8.2 million (1977 dollars). Given the relatively large urban work force, the leveling or decline in employment opportunities, and the relatively small labor requirements, construction of the Air Mobile assembly testing facilities is not anticipated to result in in-migration to the Hill AFB region.

Impacts on energy in the Salt Lake City region are likely to be negligible, since the area a predominantly industrial/urban region. Energy consumption increases due to missile assembly would be expected to be less than 1.5 percent in the region. Increased consumption of energy may amount to about 270 billion kWh in an average year and 432 million kWh in a peak year.

Operation (3.3.2)

Missile assembly activity would represent a minor increase in ongoing Hill AFB activities with no significant impacts.

4. ALTERNATIVES

The alternatives discussed below only pertain to missile and aircraft flight testing. Testing discussed in this supplement pertains to the Air Mobile option, which is only one of the alternative basing modes under consideration. A discussion of other alternative basing modes under consideration may be found in Volume IV of the FEIS.

ALTERNATIVES INCLUDE:

- Reduction in the number of missile and aircraft flight tests
- Missile flight tests at other locations
- Aircraft flight tests at other locations
- Use of other existing facilities

4.1 REDUCTION IN NUMBER OF MISSILE AND AIRCRAFT FLIGHT TESTS

The missile and aircraft flight test program as planned is the minimum required to provide adequate data on system performance and reliability. Any further reduction in the test program would compromise weapon system evaluation and reduce its performance confidence level.

4.2 MISSILE FLIGHT TESTS AT OTHER LOCATIONS

Vandenberg Air Force Base has been selected by the Air Force as the primary location for the MX missile ground and flight tests. There were several alternate locations which were considered to be technically acceptable for conducting the test program, but each location had negative aspects which led to its disqualification. Any change in these negative aspects or in program direction could lead to reconsideration of a particular location. The other locations considered and the reasons for their disqualification are as follows:

- Cape Canaveral Air Force Station. Even though the uprange geometry of this area is acceptable, the Eastern Test Range capabilities (distance, sensor capabilities, etc.) are inadequate.

- Hollomon AFB/White Sands Missile Range. The launch area coverage provided by this area is acceptable but this factor is outweighed by concerns due to overfly of populous areas to reach established target zones.

- San Nicolas Island. The use of San Nicolas Island would reduce launch area hazards such as would be encountered in the Vandenberg/Santa Maria/Lompoc area, but would add costly logistical and personnel problems because of the requirements to support a large test program in a remote location and could result in potentially substantial biophysical impacts at the Channel Islands.

4.3 AIRCRAFT FLIGHT TESTS AT OTHER LOCATIONS

Edwards AFB is the site of the Air Force Flight Test Center (AFFTC), which has the facilities and trained personnel required for aircraft flight testing. Use of alternative bases is not feasible without extensive modification, new construction, and attendant environmental disruption, in addition to unacceptable cost.

4.4 USE OF OTHER EXISTING FACILITIES

Although review has not shown that a large number of existing buildings are suitable or available for use in MX missile assembly for the flight test program, the possibility remains that existing Edwards or related Palmdale facilities could be obtained for these purposes. Obtaining existing facilities rather than providing new facilities would have the following potential impacts:

- Reduced cost
- Reduced environmental impact due to construction
- Possible interruption of existing programs
- Possible increased schedule problems
- Potential increased logistical problems due to facilities not being assembled in a planned complex.
- Potential increased supervisory problems due to not being assembled in a planned complex.

5. PROBABLE UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

5.1 UNAVOIDABLE ADVERSE IMPACTS

No significant adverse effects are expected for air mobile activities on Edwards, Vandenberg, or Hill AFB or in their environs. Only minor potential adverse impacts have been identified.

5.2 SUMMARY OF ADVERSE EFFECTS THAT WOULD BE MITIGATED

Only minor impacts have been identified as likely to result from project implementation at Vandenberg and Edwards and Hill Air Force Bases. By minimizing the amount of surface area that is disturbed, potential impacts to the topography and to biological resources can be reduced. Recontouring and reseeding of any disturbed areas after completion of construction activities will further reduce topographic, biological, and aesthetic impacts.

The potential for impacting two known archaeological sites at Vandenberg AFB has been identified. These potential impacts will be minimized through the following means.

- Intensive archaeological survey will be completed in all direct impact areas. These include the areas of road improvements, and any additional areas where surface disturbance is planned.

- When the boundaries and present condition of all archaeological sites within the direct impact zone are known, project plans will be modified to the extent possible to avoid these remains.

- Where preservation of sites through avoidance is not possible a data recovery program will be developed in consultation with the State Historic Preservation Officer, and the Advisory Council on Historic Preservation.

6. RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND LONG-TERM PRODUCTIVITY

- The MX flight test program at Vandenberg and Edwards and the missile assembly at Hill will generate additional income and employment in the local and regional areas. This will be generally consistent with local goals concerning growth, and it will maintain Hill as significant parts of the local economic bases.

- In the long term, the MX project will add to the local industry (or economic base) and accelerate overall development.

- The long-term consequences include helping to validate the MX system's capability to maintain the Nation's deterrent posture through maintenance of strategic forces which can survive attack in sufficient numbers to ensure significant damage to an enemy power.

- Off-base lands will be dedicated to commercial and residential development in support of new economic and population growth induced by the project. So long as this growth is consistent with local plans, no significant impacts on long-term productivity are anticipated.

7. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Construction Phase (Vandenberg, Edwards, and Hill)

- During the construction period, the substantial commitment of resources includes the use of materials and human resources.

- The land that will be occupied by the MX facilities will likely not be used for other purposes unless there are significant mission realignments at these bases.

- Some irretrievable loss of archaeological sites may occur during construction. However, archaeological losses can be partially offset by the development and implementation of a data recovery program. Materials and resources that would be committed for the flight test program are not in short supply.

- Construction of the facilities will displace fauna by removing habitat in the construction zones. Portions of the areas could be restored to its native condition following the useful life of the project.

Operation Phase (Vandenberg, Edwards, and Hill)

- The major commitments of resources include nonrecyclable materials in components, petroleum based fuels, rocket and propellants, and human resources.

- Certain exotic, unique, or particularly valuable materials or other resources (such as previous metals and special ceramics and cements) may be expended and irretrievably lost during the fabrication of components of the missile or expended during launch operations.

- Some growth of local communities with related conversion of open space or undeveloped land to urban uses will result from the project.

8. CONSIDERATIONS THAT OFFSET THE ADVERSE IMPACTS

The considerations that offset the adverse impacts are discussed in Volume III of Section 8 of the FEIS.

9. DETAILS OF UNRESOLVED ISSUES

The following issues are currently unresolved and have not been addressed in detail in this supplement. These issues could have adverse effects and/or could be mitigated effectively with regard to potential environmental impacts. Additional program details and ongoing reviews are expected to resolve many of the issues presented in this section.

- Firm configuration of the specific missile to be tested, the aircraft, ground vehicles, support buildings and associated items, construction methods, and materials will require additional design detailing not available at the time of report production. Variances of impacts by location and degree from socioeconomic, biological, and physical perspectives can be extensive.

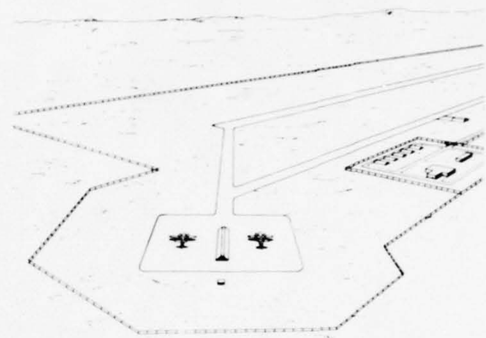
- For Edwards AFB, it has been suggested that a portion of Edwards AFB will be configured to represent the alert base, dispersal site, and main operating base to support weapon system testing. Should existing facilities be temporarily designated as a main operating base, significant impacts are anticipated. Should construction be required for a typical alert base configuration, site-specific impacts and secondary aspects will require future analysis although designation without construction could be accomplished with no significant environmental impacts.

- Whether the missile assembly facility will be built at Edwards AFB, Hill AFB, or at a selected main operating base is not specified at this time and will be determined during FSED.

- Mission realignment or revision may result in different uses of the test site locations after the completion of the test program. These alternative uses cannot be anticipated at this time but could include the conversion of facilities for Strategic Air Command and support command personnel for use during the life cycle of the MX program.

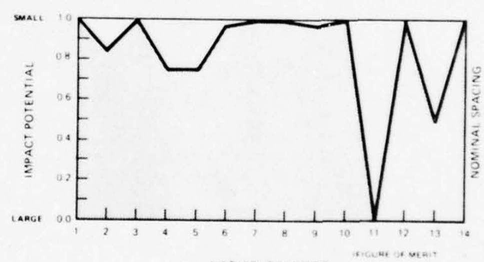
- Recent water resources issues in Lompoc Valley and Antelope Valley could affect the future supply to single and multiple family dwellings.

IV
Basing Mode Evaluation



IMPACT PROFILE – MPS OPTION

VERTICAL SHELTER, POINT SECURITY, 1/3 FORCE



SUMMARY
CHAPTER IV

BASING MODE EVALUATION

The alternative basing modes under consideration include the four multiple protective structures basing modes described in the FEIS and the Air Mobile basing concept developed in this Supplement.

For the purpose of this environmental analysis, five configurations of the Air Mobile concept were studied. These configurations recognized the diversity of available base types which include:

- Main operating bases (MOBs) — Central support facility
- Alert Bases — Location of aircraft on 24 hour alert, new, co-military, and co-civilian
- Dispersal sites — Locations to which aircraft move during actual or imminent attack

A set of basing configurations was chosen for incorporating elements of the main and alert bases to bound the range of potential environmental impacts.

Certain potential impacts of the Air Mobile basing mode alternative are to some degree independent of the specific site or project configuration. Regional expenditure, noise, and energy requirements are examples.

A Systematic Ranking Methodology (SRM) was used for each project configuration to produce impacts for each of 14 aggregated environmental variables representing anticipated concerns.

Impact profiles were generated to compare Air Mobile with MPS. Overall system impact potentials for Air Mobile (AMST) and MPS (vertical shelter, point security) are approximately equivalent although the separate projects impacted different sectors of the environment. Air Mobile has higher impacts in noise, energy consumption and public perceptions of safety. MPS has higher impacts in local economies and local government issues.

This Supplement is based on a range of system parameters which are representative of the Air Mobile concept. These parameters are important in predicting environmental effects and will be defined further should the Air Mobile concept enter FSED.

1. BASING MODE

1.1 INTRODUCTION

The alternative basing modes under consideration include the four multiple protective structures (MPS) individually described in the MX: Milestone II FEIS and the air mobile concepts developed in this Supplement. Compared to the MPS system, the air mobile missiles are somewhat smaller, the main operating bases correspond to the missile support bases, the aircraft are analogous to the roads and over-the-road transporters, and the alert bases and dispersal sites replace the shelters. The total number of people required for air mobile operations would be greater than those required for MPS, but the distribution would be over a much broader area with interspersed population centers between project basing areas. The system required may be located in the North Central or Central region of the continental United States because of its special need for advance warning.

For the purpose of this environmental analysis, five configurations of the air mobile concept were studied. Chapter 1 described the basic parameters of the air mobile concept, such as missiles, aircraft, and bases which reflect the range of costs and operational needs anticipated. For purposes of the environmental analysis, these parameters were expanded to ensure that potential environmental impacts were bounded. Table 1-1 contains the five configurations that were chosen to analyze and bound the potential range of impacts.

The five configurations studied recognize the diversity of available base types, including main operating bases. Alert bases can be new or existing military or civilian bases. In the latter case, the joint use of the bases with other military or civilian aircraft are considered. Finally, each alert base can have one or two new runways of a length dependent on the type of aircraft deployed. The primary and expanded areas were described in Chapter 1, and are shown in Figure 1-1.

Table 1-1. MX air mobile supplement conceptual configurations.

FORCE ELEMENT	TYPICAL		LOW COST		NO ALERT BASES
Missiles	240	200	240	200	200
Aircraft					
Type	AMST	WBJ	AMST	WBJ	WBJ
No. on Alert	240	100	120	100	100
Total	420	175	210	175	175
Main Operating Bases					
Missile & aircraft support	2	2	2	2	2
Aircraft support only	8	2	3	2	2
Alert function only	-	-	-	-	6
Total	10	4	5	4	10
Alert Bases					
Co-use military					
Four aircraft Zero new runway	20	10	10	10	-
Four aircraft One new runway	10	3	5	5	-
Four aircraft Two new runways	-	-	5	5	-
Two aircraft Zero new runway	10	8	8	-	-
Subtotal	40	21	28	20	-
New					
Four aircraft One runway	15	5	-	-	-
Four aircraft Two runways	5	2	-	-	-
Subtotal	20	7	-	-	-
Co-use civilian					
Four aircraft Zero new runway	7	-	5	5	-
Two aircraft Zero new runway	2	2	2	-	-
Subtotal	9	2	7	5	-
Alert Base Total	69	30	35	25	-

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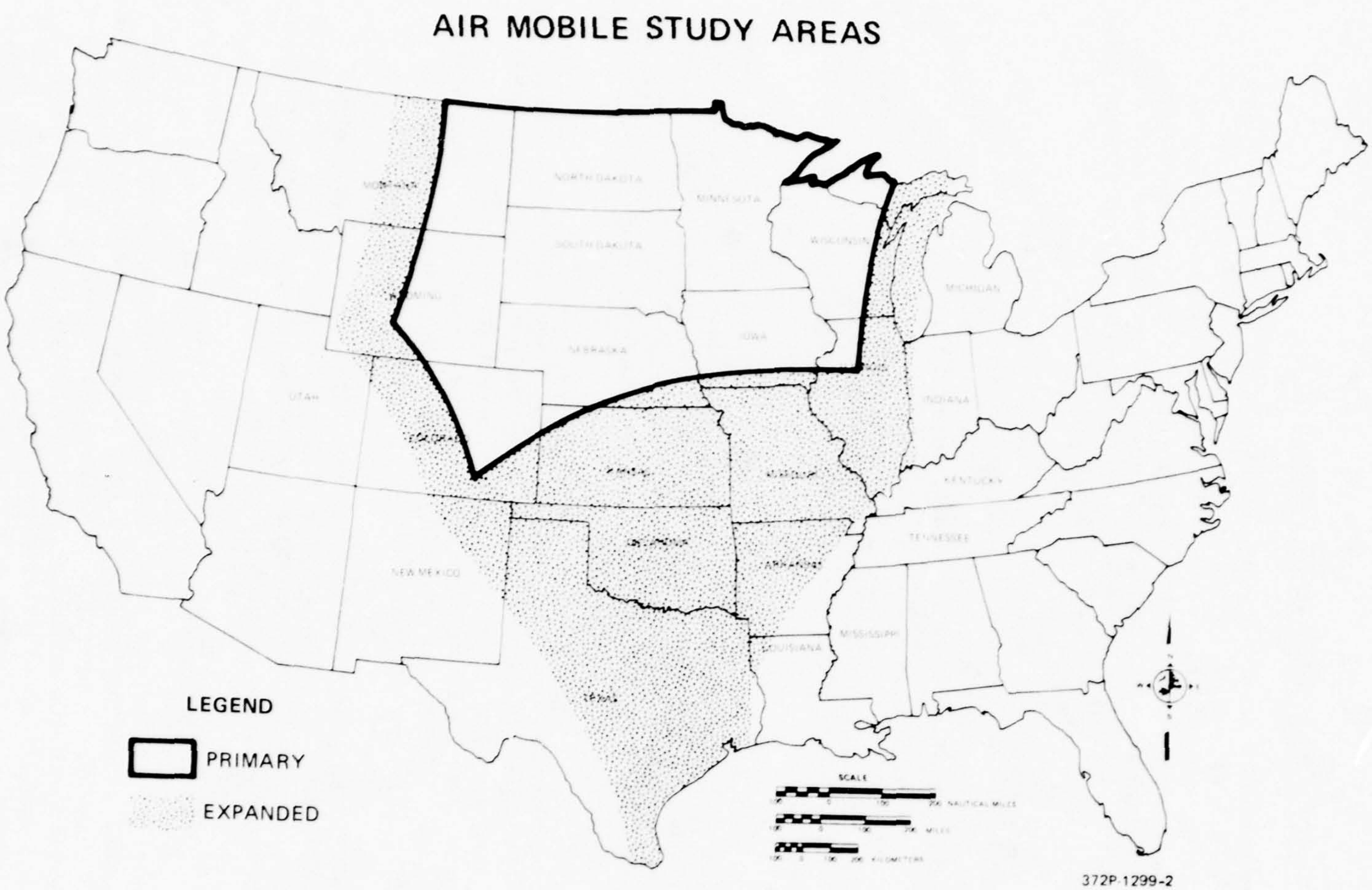

Figure 1-1. Air mobile study areas.

General Environment of the Central CONUS (1.2.1)

The primary and expanded study areas lie in the Central United States (Figure 1-2), which is typified by the generally flat plains of the interior and the Gulf Coast. The plains are bordered on the west by rugged mountainous provinces, except to the southwest where they meet a relatively flat portion of desert land. To the east, the plains extend to the Appalachians, interrupted only by a highlands area in Missouri, Arkansas, and eastern Oklahoma.

Figure 1-3 shows the physiographic provinces of the study area. The boundaries between provinces, generally, are distinct. Some boundaries, however, are not sharp but gradual over wide areas, even though the provinces they separate are structurally distinct.

Provinces that lie wholly or partially in the study area are briefly characterized in Table 1-2. The Great Plains, Central Lowland, Superior Upland, and Coastal Plain provinces cover most of the area used for analysis.

Generalized and specific study areas have been used in this study to characterize the existing environment. The general study areas were defined and appropriate exclusion areas were then delimited and deleted from further consideration. Within the remaining areas, specific areas were then selected to represent a range of alternative environments into which the project might be introduced.

Most, and preferably all, MOBs and alert bases will be sited at existing military airfields or co-use civilian facilities, such as Air National Guard installations. The areas around these airfields are typically low intensity developed areas highly modified by human use and activities. Immediately adjacent to these airfields, vegetation is maintained at very low heights.

The Air Force plans to use existing airfields for alert bases wherever possible. However, for the purposes of this study, consideration was given to possible construction of alert bases. Such a base would be sited away from existing population centers.

Sensitive Environmental Regions (1.2.2)

As part of the environmental analysis, it was necessary to determine the areal extent of the usable site region so that a determination of typical site characteristics could be made and to establish that ample room remained for siting of the bases. Populated areas were excluded and special consideration was given to sensitive environmental characteristics in the primary and expanded study areas. In this way,

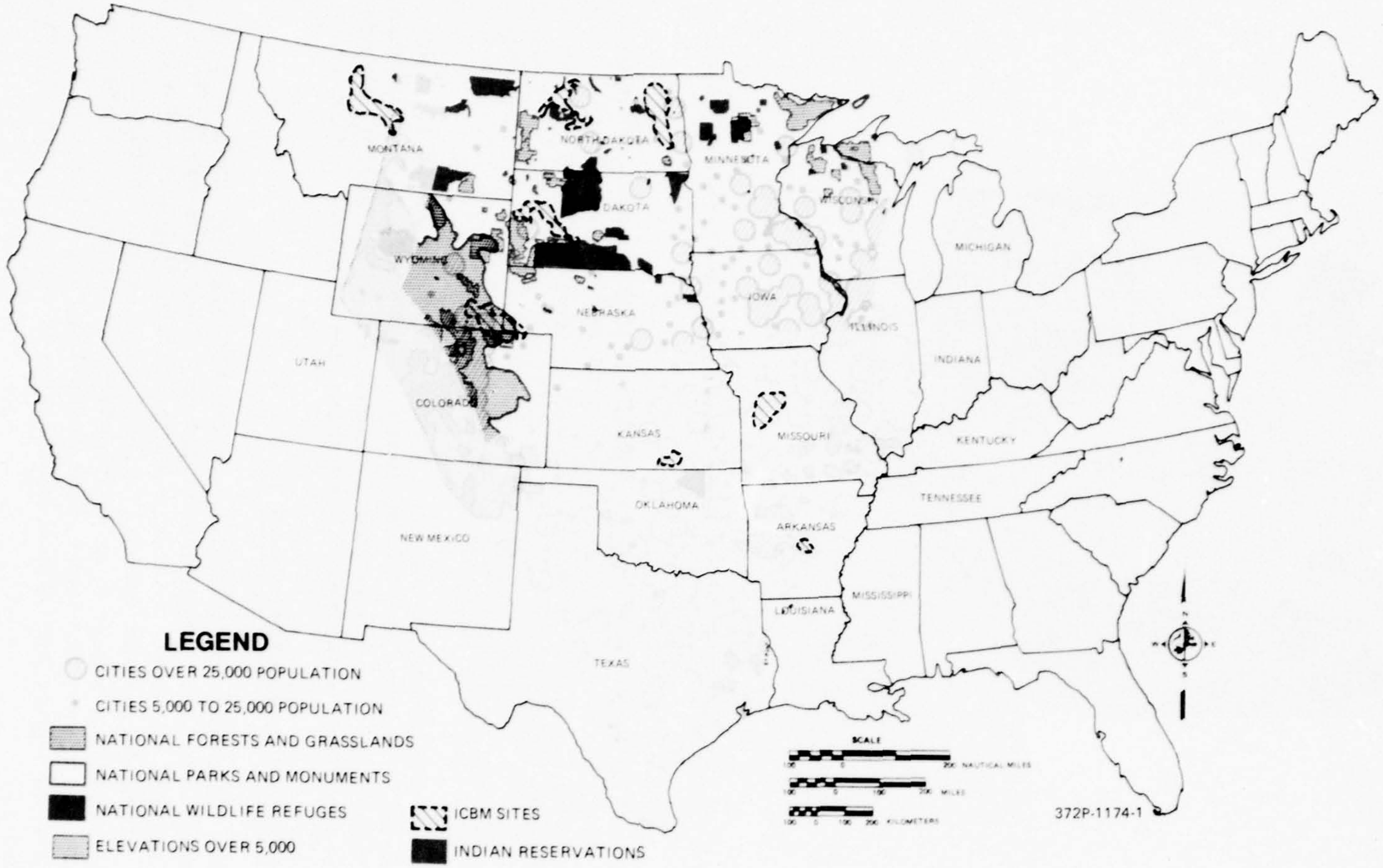

Figure 1-2. The project study area.

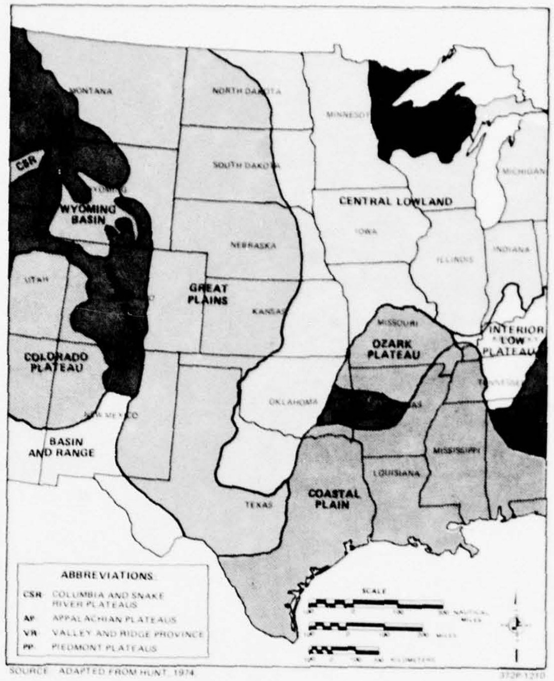

Figure 1-3. The physiographic provinces of the study area.

the environmental analysis could address itself to the common environmental characteristics of the project area and certain specific impacts. Described below are those areas which were determined to be environmentally sensitive.

Sensitive Air Quality Areas (1.2.2.1)

The Environmental Protection Agency (EPA), in their 1976 National Air Quality and Emissions Trends Report has identified sensitive areas with respect to total suspended particulates (TSP), sulfur dioxide (SO_2) and photochemical oxidants. These areas are shown in Figure 1-4.

Sensitive Biological Areas (1.2.2.2)

The following designated areas are biologically sensitive and will be discussed below: areas designated or proposed as critical habitats of endangered species; federally designated or proposed natural landmarks, state designated natural areas or preserves; designated research natural areas and national or state wildlife refuges. In addition, wetlands and rivers and associated (riparian) terrestrial habitats are sensitive to impact and should be considered when specific locations are studied.

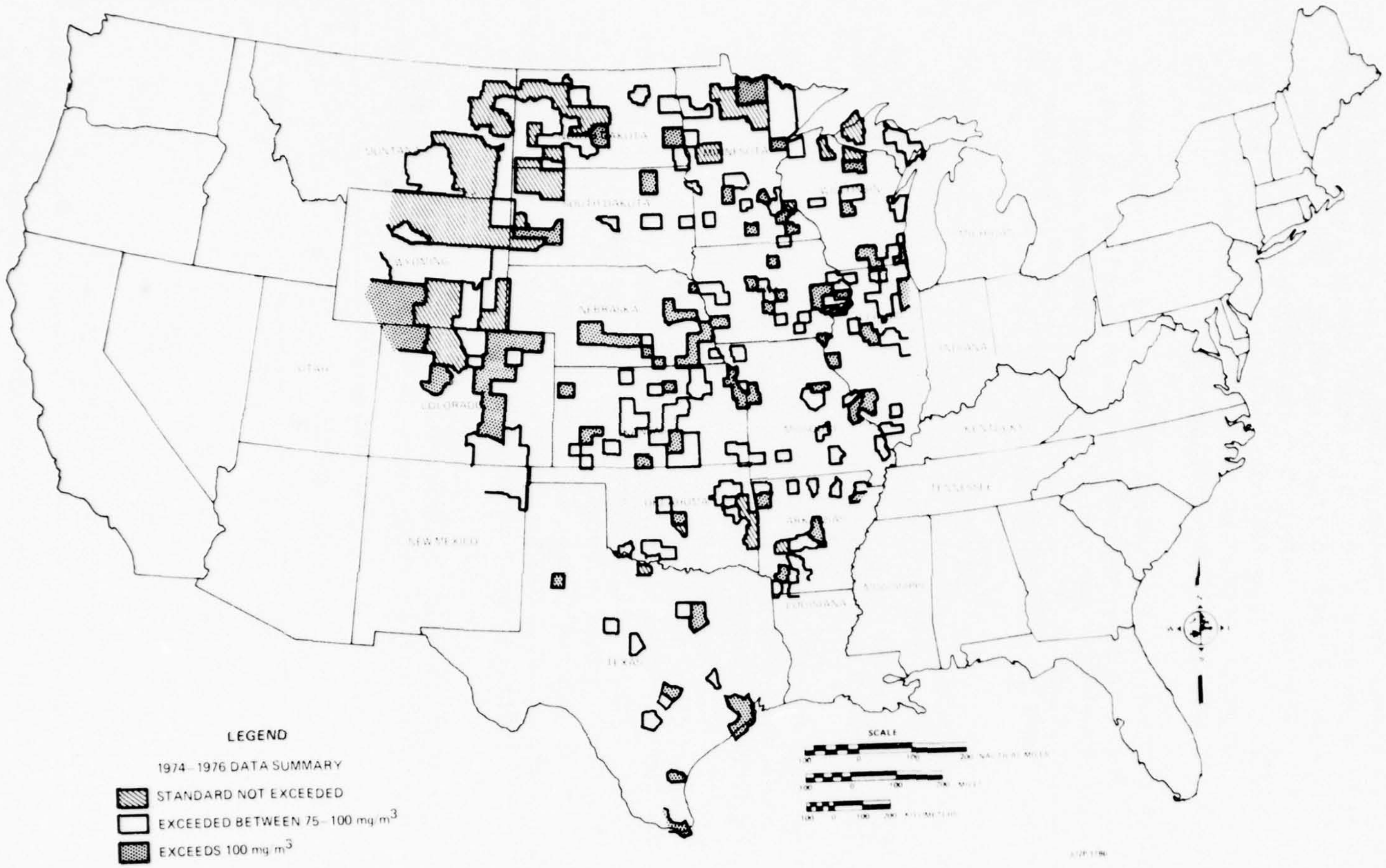

Figure 1-4. Areas having problems with one or more of the atmospheric pollutants.

Section 7 of the Endangered Species Act of 1973 requires all federal agencies to insure that their actions do not jeopardize the continued existence of endangered or threatened species, or result in the adverse modification of their critical habitats. This remains unchanged under the Endangered Species Act amendments of 1978. For the purpose of this analysis proposed critical habitats, although not protected under the Endangered Species Act were avoided. Locations of proposed critical habitats are shown in Figure 1-5.

In the North-Central CONUS critical habitat has been designated for the whooping crane and gray wolf and has been proposed for the whooping crane, Dakota skipper butterfly, Pawnee Mountain skipper butterfly, and Illinois mud turtle. Table 1.2.2-1 gives the areas of designated critical habitats in the North Central CONUS.

In the Southern Central CONUS designated critical habitats exist for the whooping crane, Houston toad, and Indiana bat. Within this region, critical habitat has been proposed for the Ouachita madtom. Table 1.2.2-2 gives the areas of designated critical habitats occurring within the South-Central CONUS study area.

The National Park Service has identified natural areas of national significance under a series of theme studies and these areas are being entered into a national registry of Natural Landmarks (Figure 1-6). (The landmark program is now being continued under the auspices of the Department of Interior National Recreation and Heritage Conservation Service.) In the Central CONUS area, theme studies and recommendations have been made for the Great Plains natural region (Colorado State University, 1975) which comprises about half the North Central CONUS region and portions of Colorado, Nebraska, Kansas, New Mexico, Oklahoma, and Texas in the South Central CONUS. Studies for the Central Lowland Natural Region which comprises most of the remaining area are underway

Table 1.2.2-1. Areas within the designated critical habitats for the gray wolf and whooping crane in the North Central CONUS.

SPECIES	CRITICAL HABITAT[1]	AREA (MI^2)
Gray Wolf	Zone 1 (MN)	4,488
	Zone 2 (MN)	1,856
	Zone 3 (MN)	3,501
Whooping Crane	Platte River Bottoms (NE)	162

[1]Name of critical habitat as given in the Federal Register with the state in parentheses.

Figure 1-5. Designated critical habitat.

Table 1.2.2-2. Areas within designated critical habitats.

SPECIES	CRITICAL HABITAT[1]	AREA (MI^2)
Whooping Crane	Monte Vista NWR (CO)	16
	Alamosa NWR (CO)	21
	Quivira NWR (KS)	34
	Cheyenne State Management Area (KS)	34
	Salt Plains NWR (OK)	50
	Aransas NWR (TX)	141
Houston Toad	Burleson County (TX)	*[2]
	Bastrop County (TX)	*[2]
Indiana Bat	Blackball mine (IL)	*[3]
	Cave 021 (MO)	*
	Cave 009, 017 (MO)	*
	Pilot Knob Mine (MO)	*
	Bat Cave (MO)	*
	Cave 029 (MO)	

[1]Name of critical habitat area with state in parentheses.

[2]Total area unknown but located near urban areas or in parks which eliminates it from potential siting area.

[3]Total area not known but caves and mines would be in areas unsuitable for air mobile siting.

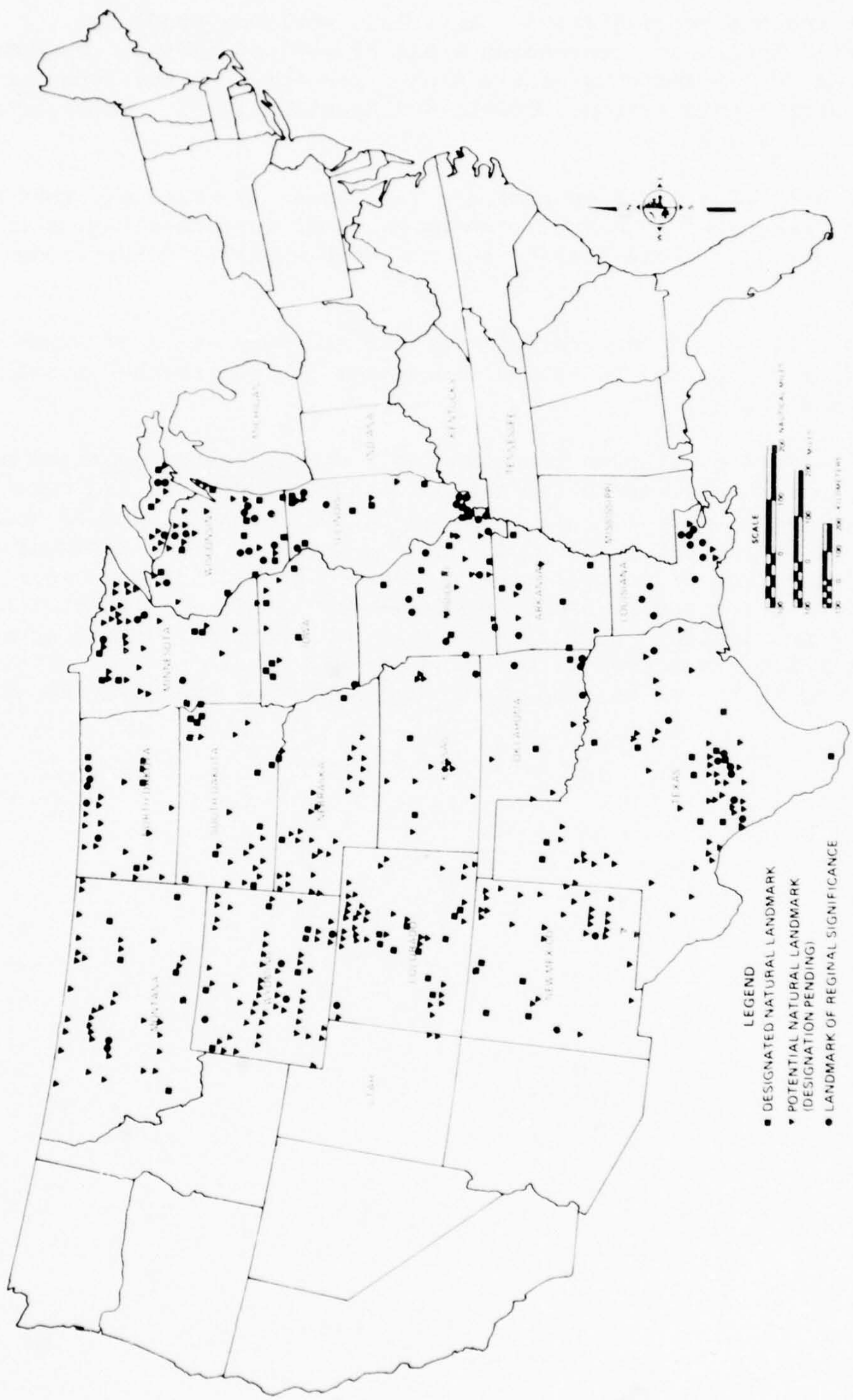

Figure 1-6. Distribution of natural landmarks of national regional significance.

but data are not yet available. An inland wetlands study has inventoried remaining outstanding areas of wetland habitat throughout the United States and thus provides data for this habitat type for all states under consideration (Goodwin and Manning, 1975). These areas are shown in Figure 1-7.

Table 1.2.2-3 gives approximate land areas by state of areas proposed or designated as Natural Landmarks under the Great Plains and Interior Wetlands theme studies for the North-Central CONUS study region.

Table 1.2.2-4 gives approximate land areas by state of areas proposed or designated as natural landmarks for the South-Central CONUS study region.

These totals although representing a significant proportion of the areas being inventoried in the Natural Landmarks Program are not complete because data from other theme and natural region studies have not become available. Other natural areas such as state designated natural preserves or natural areas, research natural areas, areas owned by or being purchased as nature preserves by the Nature Conservancy should be considered. These areas would be identified during environmental studies associated with siting the air mobile option. Their total areal extent in the two study regions is not presently known.

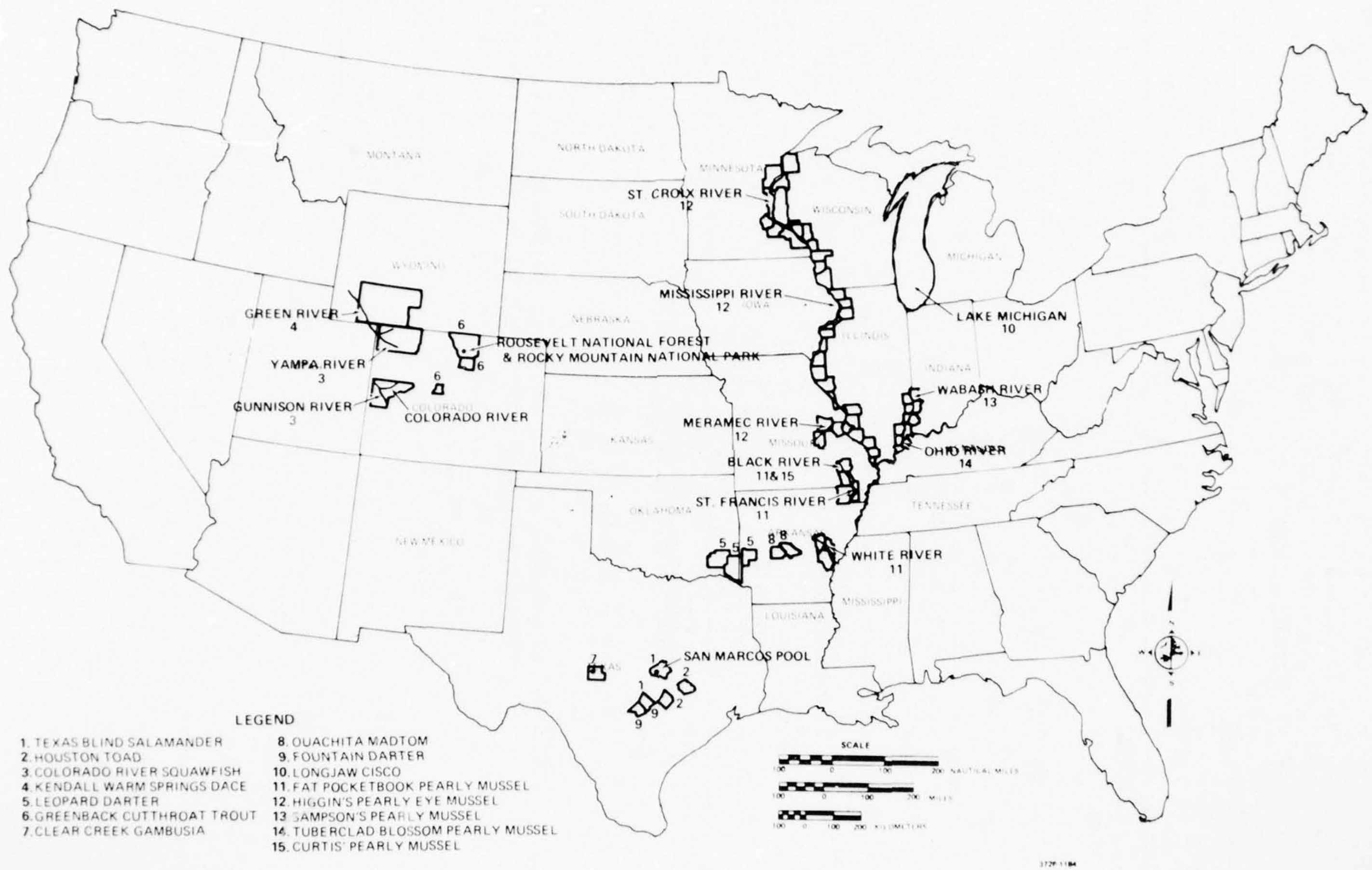

Figure 1-7. Federally protected amphibious and aquatic species.

Table 1.2.2-3. Approximate land areas of proposed or designated natural landmarks under the Great Plains and Interior Wetlands theme studies for the North Central CONUS by state.

STATE	AREA IN SQUARE MILES
Colorado	160
Iowa[1]	4
Michigan[1]	1.4
Minnesota[1]	376
Montana	2,000
Nebraska	1,000
North Dakota	314
South Dakota	1,686
Wisconsin[1]	66
Wyoming	806

[1] Inland wetlands theme only

Table 1.2.2-4. Approximate land areas of proposed or designated landmarks under the Great Plains and Interior wetlands theme studies for the South Central CONUS by state.

STATE	AREA IN SQUARE MILES
Arkansas[1]	4.7
Illinois[1]	11
Kansas	97
Missouri	37
New Mexico	860
Oklahoma	70
Texas	390

[1] Inland wetlands theme only

Sensitive High Population Growth Rate Areas (1.2.2.3)

High population growth areas are defined as areas which have experienced a population growth rate of two percent or more per year over the 1970-1975 period (Figure 1-8). Such areas are considered to be sensitive because they are already experiencing the impacts of growth and could be most heavily impacted by additional growth. When growth outstrips capacities of services such as schools, water supply, sewerage, or police and fire protection, the community either suffers decreasing levels of service or assumes the costs associated with increasing services to meet existing or projected demands. When high growth rates cause a shortage of available housing, prices and rents increase causing property values and taxes to increase. These inflated housing costs may force some people to leave the area, which has serious sociopolitical repercusions. If a large project such as an MOB, which will induce additional population growth, is sited in an area currently experiencing a high growth rate, an already difficult situation may be exacerbated.

Nearly 90 counties in the North Central CONUS study area experienced an average annual rate of population growth of two percent or more during the years 1970 through 1975. These counties occur in every state which is within or partially within this area with the exception of the northern portions of Kansas and New Mexico. The combined total area of these high growth counties is equivalent to approximately 20 percent of the North Central CONUS area.

Nearly 160 counties in the South Central CONUS portion of the study area experienced an average annual rate of population growth of two percent or more during the years 1970 through 1975. These counties occur in every state which is within or partially within this area with the exception of the included portions of Colorado, New Mexico, and Louisiana. The combined total area of these high growth counties is equivalent to approximately 25 percent of the South Central CONUS area.

Sensitive High Agricultural Output Areas (1.2.2.4)

High agricultural value areas are defined as areas which have a market value of agricultural products sold per acre of $100 or more (Figure 1-9). Such areas are considered to be sensitive because there is a high dollar cost associated with the purchase of highly valuable agricultural land, and a strong argument can be made that high value agricultural land should remain in agriculture as the best use of that land.

Approximately 270 counties in the North Central CONUS study area had a market value of agricultural products sold per acre of $100 or more during 1974. These counties occur primarily in the southeastern portion of this area. The combined total area of these high value

agricultural areas is equivalent to nearly 30 percent of the North Central CONUS area. Approximately 160 counties in the South Central CONUS study area had a market value of agricultural products sold per acre of $100 or more during 1974. Most of these counties occur in Illinois and Arkansas. The combined total area of these high value agricultural areas is equivalent to approximately 20 percent of the South Central CONUS area.

Sensitive Archaeological Areas (1.2.2.5)

The areas within the North Central CONUS that are archaeologically most sensitive tend to occur, in general, along the rivers. Modern farming practices have removed significant portions of the archaeological resource base, primarily in the eastern half of the study area. Because of their depth, however, many sites remain largely intact despite cultivation. Throughout the North Central CONUS, riverine areas are the most sensitive, easily definable areas. Other sensitive areas are known to exist but they are less extensive and are more difficult to identify with available data.

There are about 7,000 miles of major rivers in the North Central CONUS region along which site density and thus archaeological sensitivity would be expected to be high with greatest concentrations of sites occurring within a mile of the rivers.

Archaeologically sensitive areas in the South Central CONUS study region occur primarily along river drainages especially in the eastern portion. Complex sites of the woodland and Mississippian traditions are numerous and apparently centered in the Missouri and Mississippi River Valleys. However, Paleo-Indian sites are more frequent in the western portion with Plains Village sites occurring along river drainages. In the southern Texas area, sites typical of mobile hunting and gathering people are found, but are not restricted to riverine areas.

There are about 9700 miles of major rivers in the South Central CONUS region along which site density and thus archaeological sensitivity would be expected to be high with sites tending to be concentrated within a mile of the rivers.

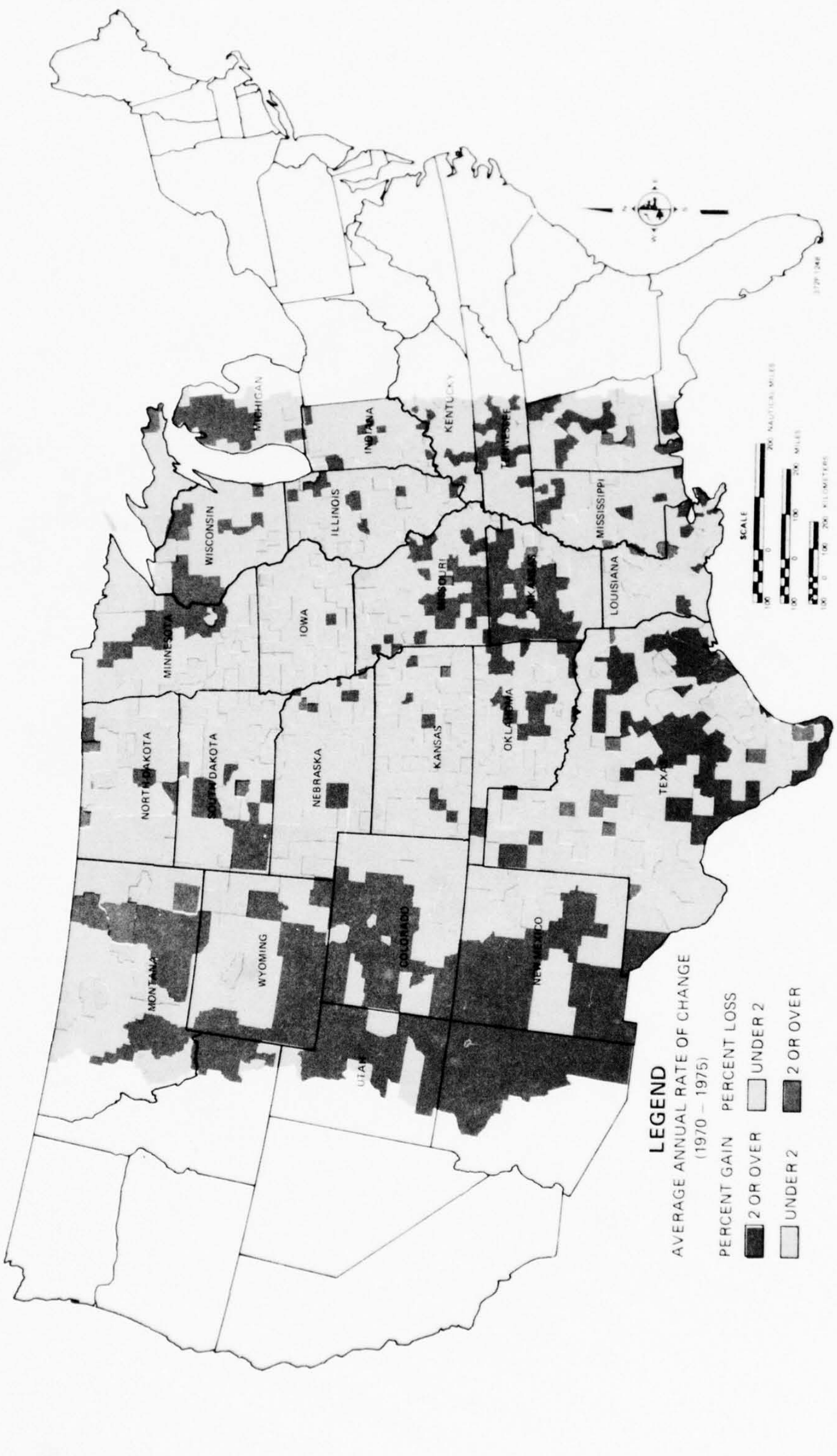

Figure 1-8. Average annual rate of change (1970 - 1975)

Figure 1-9. Market value of agricultural products sold per acre in dollars (1974).

2. LAND USE

2.1 OVERVIEW OF LAND USE IN CENTRAL CONUS

The most prevalent land use in the states of the central CONUS is agriculture. Table 2-1 lists states within the study area in order of their increasing percentage of agriculture land. Approximately 75 percent of the total land area is in agriculture. The remaining 25 percent of the land area of these states is urban, vacant, or in other non-urban uses (e.g., protected natural lands, recreation lands, etc.).

The area within the Central CONUS where agriculture is most prevalent corresponds closely to the limits of the Great Plains, the Central Lowland, and the Texas portion of the Coastal Plains. In the Great Plains, grazing of livestock (cattle and sheep) is the dominant agriculture use. Although total production of livestock is much greater in the Central Lowland, land area devoted to livestock production there is actually a smaller proportion of the whole. The extremely productive Central Lowland has most of its agricultural land in crops (primarily grains).

Population growth areas are well dispersed throughout the Central CONUS and are intermixed with areas of declining population as previously described in Section 1.3 and illustrated in Figure 1.3-7. The nationwide trend toward urban population growth and rural population decline is most notable in this agriculturally oriented Central Region of the nation. Additionally, several regions within the study area have exhibited significant (over 2 percent per annum) growth between 1970 and 1975. These include the Rocky Mountain states, western South Dakota, the Superior Upland Region (i.e., northern: Minnesota, Wisconsin, and Michigan), the Ozark/Ouachita Plateau, and the southeast half of Texas.

2.2 INTERACTIONS BETWEEN MILITARY BASES AND NEARBY COMMUNITIES

The influence of a military base on local land uses is dependent in part upon the size of the base, its distance from nearby communities, and the size of those communities. Most of the land-use changes which occur in the vicinity of a military base and which are attributable to the presence of the base are a consequence of the influx of personnel and associated local purchases of goods and services which result in economic stimulation and the attraction of new people to the area. The resulting

Table 2-1. Land in agriculture in Central CONUS states (1974).

STATE	TOTAL LAND AREA (000s of acres)	LAND IN AGRICULTURE (000s of acres)	LAND IN AGRICULTURE (% of total)
Michigan	36,363	10,832	29.8
Louisiana	38,755	9,133	31.7
Arkansas	33,245	14,642	44.0
Wisconsin	34,857	17,625	50.6
Colorado	66,410	35,902	54.1
Minnesota	50,745	27,605	54.4
Wyoming	62,210	34,272	55.1
New Mexico	77,704	47,046	60.5
Montana	93,176	62,158	66.7
Missouri	44,157	29,801	67.5
Indiana	23,102	16,785	72.7
Oklahoma	44,020	33,083	75.2
Texas	167,766	134,185	80.0
Illinois	35,679	29,095	81.5
Kansas	52,344	47,946	91.6
Iowa	35,802	33,045	92.3
Nebraska	48,949	46,172	94.3
South Dakota	48,611	45,978	94.6
North Dakota	44,335	42,387	95.6
Central CONUS States Totals	1,028,230	717,692	74.5
Remainder of United States[1]	1,896,949	295,586	15.6
United States[1]	2,925,179	1,013,278	34.6

[1]Exclusive of Alaska and Hawaii

Source: U.S. Department of Commerce, 1978.

population growth may require land to be converted to residential, commercial, transportation, and recreational uses.

A moderate size military base (12,000 to 15,000 persons) would typically have different degrees of influence on communities of different sizes. A small town adjacent to or very near a base may be dominated by the influence of the base, while a medium-sized city might be greatly influenced, but not totally dependent. A large metropolitan area, by contrast, may have one or more bases nearby which are not significant modifiers of the regional economy or land-use patterns.

A nearby small town feels the influence of a moderate size Air Force base in practically every aspect of its existence, particularly if there are no other larger communities within easy commuting distance. Also, land prices in town and on adjacent properties tend to fluctuate somewhat with manning levels at a nearby base and would likely experience a rise if there were a prospect for expanded activities at the base.

The majority of the existing Air Force bases in Central CONUS are located within commuting distance of a medium-sized city of 20,000 to 50,000 persons. Base employees and dependents generally equate to approximately one-quarter to one-third of the population of the city. The two major industries in the area are the Air Force and agriculture. In several locations, government or government-supported activities comprise the largest percentage of employment in the region. Such strong dependence upon military employment and spending ties the growth of these communities very close to the Air Force programs.

Generally, the more important population growth effects resulting from a new program at a military base are indirect growth-induced effects through regional economic stimulation. The employment opportunities generated by this economic activity may exceed the local labor force's supply of unemployed and underemployed workers who are actively seeking employment. These employment opportunities, coupled with the new availability of onbase jobs, precipitate migration into the region. In-migrants may become residents of the region, and require development of new residental, commercial, transportation, and recreational facilities thus requiring a conversion of some existing land uses. The land which would most likely be connected in the Central CONUS is that within or adjacent to existing communities, which could include land currently in agricultural uses.

New in-migrants compete with existing residents for housing and other public and private goods and services. Price increases almost certainly result in the housing market as individuals with generally higher incomes complete for housing with lower income current residents. At the same time, some mitigating price level decreases in other goods may evolve, due to expansion of the area's trade and service sectors and increased scale of operation and competition.

The existing population could be affected in a number of other ways. It is probable that taxes would increase to pay for new or expanded public services, thus affecting land sale and prices.

2.3 POTENTIAL INTERACTION BETWEEN ALERT BASES AND LOCAL LAND USE

The alert base concept is different from that at established Air Force bases and requires considerably less interaction with local communities, hence, less indirect impact upon land use. Most of the personnel at an alert base would rotate from an associated main operating base (MOB).

Support for alert bases would originate from the MOBs. Off-base housing for dependents and support personnel would not be required in the alert base vicinity.

The direct land use impacts of an alert base depend upon whether the base is located at an existing airfield or is newly constructed. To the maximum extent practical, the alert bases are expected to be established at establishing airfield locations. In such cases, impacts on existing land use are expected to be minimal. Approximately 1,300 acres (525 ha) are required for an alert base. The land obtained for construction of bases may be land which is currently devoted to agriculture or other nonurban uses.

2.4 SELECTION OF SAMPLE SITES

For the purposes of this analysis, the configurations discussed in Section 1 were overlaid on sample areas. This was accomplished through the selection of sample sites characteristic of the environment in both the primary and expanded siting areas. In addition, characteristic areas of the country have been identified and are considered. These typical locations are not sites under consideration but only typical areas from physical, geological, and socioeconomic perspectives.

Sample sites were selected as follows:

- The primary study area was defined as the North Central part of the continental United States (CONUS).

- A secondary study area was defined to extend to the Gulf Coast and approximately 100 nmi closer to the Atlantic and Pacific coasts.

- The size of study areas were reduced through the application of exclusion criteria.

- Within the remaining area, sites that meet minimal criteria and represent a range of environments were selected for detailed study.

If the air mobile option is selected for Full-Scale Engineering Development (FSED), a separate environmental impact statement will precede actual site selection. For the purposes of this environmental analysis, both existing and hypothetical locations were included as sample sites.

Several dozen existing USAF bases, other existing airstrips, and areas without airstrips were examined on multiple criteria including land use, land cover, climate, population density, growth rates for employment and population, unemployment levels, agricultural value, and income per capita. Key criteria for this selection process at the sample sites are shown in Table 2-2. The sample sites used for analysis are:

MOB 1, located in the western portion of the North Central CONUS, represents an existing USAF base. The regional economy is generally small and based on agriculture, military, and tourism.

One community of approximately 45,000 people is located within 10 miles of the base and only about 115,000 people live within a 60 mile radius of the base. The unemployment rate near MOB 1 is low as is typical of midwestern rural communities. Population growth has been higher than average. While agriculture is a widespread activity, the average value of crops produced per acre is relatively low. The area is fairly typical of many communities throughout the upper midwest and particularly typical of those communities with a military base in the vicinity. This same base is used for analysis purposes as Alert Base 1.

MOB 2 is located in the South Central portion of Central CONUS representing an existing USAF base. The regional economy is relatively large and supported by manufacturing, petrolum processing, finance, and agriculture. While MOB 2 is a large base, it does not dominate the

Table 2-2. Comparative data on sample MOBs, sample alert bases, and U.S. average.

AREA	POPULATION PER SQ MI	AVERAGE ANNUAL POPULATION GROWTH RATE (%) (1970-1975)	AVERAGE ANNUAL EMPLOYMENT GROWTH RATE (%) (1970-1975)	UNEMPLOYMENT RATE (%)	INCOME PER CAPITA ($)	AGRICULTURAL OUTPUT PER ACRE ($)
MOB 1	24	2.6	3.1	3.3	5,250	13
MOB 2	768	0.4	1.7	4.9	6,090	61
Alert Base 1	24	2.6	3.1	3.3	5,250	13
Alert Base 2	41	1.6	0.4	5.4	4,630	46
Alert Base 3	33	0.4	2.6	2.7	6,690	215
Alert Base 4	33	3.9	1.7	4.5	4,120	37
U.S. Average	60	0.9	1.7	7.0	5,850	79

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region. Nearby communities include one of almost 400,000 people and several smaller ones. Population density is very high with several other major cities within 300 miles. The unemployment rate in the immediate area is moderately high for the study areas but below the national average. This area is typical of the urbanized portions of the study area.

Alert Base 2 represents an existing USAF base located in the Central CONUS. The area is representative of many medium to small communities throughout the study area where agriculture and government are important components of the local economy. Economic growth has stagnated and unemployment is high for a predominantly rural area. Per capita income of this location is one of the lowest of any study area. Population density is relatively low with only one community of approximately 25,000 people nearby, although three cities, including two major urban areas, are within 300 miles. Alert Base 2 differs from Alert Base 1 chiefly in that it has a more depressed economy.

Alert Base 3 represents locations in the eastern side of North Central CONUS in one of the most productive agricultural regions of the country. The high agricultural output combined with the low population density produces the highest per capita income of any study area. Only one small city (population of 10 300) is within 10 miles but three large cities, including one major metropolitan area, are within 300 miles. There is no airfield currently in the vicinity of the area designated Alert Base 3 so all new construction would be required of this area were selected. Alert Base 3 is generally representative of the highly productive agricultural areas of Central CONUS, particularly the eastern portion of the region and those western portions with heavy reliance upon irrigation.

Alert Base 4 represents the southernmost sample area and is located at an existing municipal airport in a rural area. The area has grown very rapidly in recent years due to expansion of existing industry and creation of new industry. The agricultural output per acre is low compared to the majority of the other areas. Income per capita is lower than any other study area, partially because the area of the country is characterized by low incomes and partially because of a growing retirement community where incomes are generally below the median.

These locations represent a typical set of locations in the primary and expanded areas that could be impacted by selection of the air mobile alternative.

3.1 ANALYSIS TECHNIQUE

The analysis of the environmental impacts associated with the Air Mobile option requires several levels of complexity, ranging from individual expert analysis of a single basic environmental variable to the complex multidisciplinary systems analysis required for comparison of specific project configurations.

Summarized below are the main steps involved in the analysis used in this supplement.

A series of baseline analyses was used to select a reasonable set of representative site location types so that the analysis would reflect environmental conditions which bounded the range of potential impacts. The selection of these location types is described in Section 2.

Next, a matrix of anticipated concerns was developed as shown in Figure 3.1-1 below. The analysis concentrated on the major anticipated issues. Once the key issues were determined, detailed technical analyses were prepared for use in constructing the inputs to a Systematic Ranking Methodology (SRM) similar to that used in the FEIS analysis. Key issues were treated in major technical reports and secondary issues were analyzed in more condensed technical notes.

These studies together with analysis of the areal affects associated with the basic environmental variables were used to prepare radii of influence for each of the 14 anticipated concerns.

These radii of influence were then used within the available siting area to determine overlap of impacts. This overlap was used to determine the extent to which impacts associated with MOBs and alert bases should be added in the impact summary and to what extent the alert base deployment configuration should be considered a coherent whole. The basic environmental variables used in the analysis of the project configurations and their grouping into the 14 anticipated concerns is given in Table 3.1-1.

Sample sites were selected which allowed analysis of the range of environments covered by the MOB/Alert base configuration. Comparative data on sample MOBs and sample alert bases are given in Table 3.1-2.

Five project configurations were used to bracket the range of Air Mobile impacts. These five configurations include two "typical" configurations using AMST and WBJ aircraft, two "low cost" configurations using a reduced number of alert bases, and a "minimal cost" configuration with no separate alert bases. The system requirements for each configuration is given in Table 3.1-3 which shows configuration elements and structure and the associated primary factors.

AIR MOBILE BASING MODE COMPARISON
SUMMARY OF ANTICIPATED ISSUES

ISSUE REFERENCE NUMBER	ANTICIPATED CONCERNS	CONSTRUCTION					OPERATION				
		MOB	ALERT			DISPERSAL	MOB	ALERT			DISPERSAL
			NEW BASE	JOINT USE				NEW BASE	JOINT USE		
				CIV.	MIL.				CIV.	MIL.	
1.	INTERFERENCE WITH IMPORTANT SPECIES										
2.	AIR QUALITY										
3.	WATER QUALITY AND SUPPLY										
4.	LOSS OF RECREATIONAL ACCESS										
5.	NATURAL RESOURCES*										
6.	LAND RIGHTS*										
7.	ECONOMIC ISSUES*										
8.	LOCAL GOVERNMENT ISSUES*										
9.	PUBLIC SAFETY*										
10.	NOISE										
11.	ARCHAEOLOGICAL ISSUES										
12.	CEMENT										
13.	ENERGY*										
14.											

HIGH/MEDIUM POTENTIAL

LOW POTENTIAL

NONE-ANTICIPATED

J72P-1198

Figure 3.1-1. Air mobile basing mode comparison summary of anticipated issues.

Table 3.1-1. Impact aggregation(s).

ANTICIPATED CONCERN	BASIC ENVIRONMENTAL VARIABLES USED AS INDICES OF THE CONCERN
1. Interference—Important Species Potential interference with important biological species: concern for interference with individual species is formally the province of conservation agencies, Fish and Wildlife (game) management agencies, and public land management agencies. Their major constituencies include sportsmen, conservation-minded citizens, and professional and amateur biologists. Endangered species are of importance because their loss can be permanent and can indicate ecosystem disruption. Nonendangered vertebrates are important in allowing nonconsumptive recreational observation.	• threat to protected plants • threat to protected small terrestrial animals and birds • exclusion of large mammals by fencing or human presence • threat to protected aquatic species
2. Air Quality Potential degradation of air quality: air quality is principally under the protection of U.S. Environmental Protection Agency and state health and air quality boards. Decreases of air quality are of interest primarily because of their adverse health effects, and because decreased visual range is generally regarded an aesthetic degradation.	• dust (particulate) concentration during construction • dust (particulate) concentration during operation • nitrogen oxide concentration during construction • sulfur dioxide concentration during construction • reactive hydrocarbon concentration during construction • carbon monoxide concentrations during construction • potential for erosion

Table 3.1-1. Impact aggregation(s) (cont.).

ANTICIPATED CONCERN	BASIC ENVIRONMENTAL VARIABLES USED AS INDICES OF THE CONCERN
3. Water Quality and Supply Potential decrease in availability and quality of water: water quality is regulated principally by the USEPA. The major water quality concern in the project is degradation of domestic and agricultural supplies, increased sedimentation, and loss of biota. Availability of water is monitored by federal agencies such as the Army Corps of Engineers and the Bureau of Reclamation, as well as the Bureau of Land Management. Multistate, state, county, and municipal water agencies also regulate use. The major supply concern involved in this project is the impact on producing agricultural wells and biologically important springs.	• net water physically available/ water required for construction plus 10 years of operation • potential for erosion (sedimentation)
4. Recreation (Access Loss) Restriction of access and recreation: land management agencies favoring multiple use (USFS, BLM) and those specifically supporting recreation (National Park Service and Bureau of Outdoor Recreation) as well as their state and county counterparts to manage recreational activities. The public, privately organized outdoor recreational groups as well as businesses serving these groups all have interests. The variables considered include restriction of access at offsite areas by highway congestion, and exclusion from public lands at the site.	• highway congestion during construction • highway congestion during operation • public lands required not currently under Department of Defense withdrawal

Table 3.1-1. Impact aggregation(s) (cont.).

ANTICIPATED CONCERN	BASIC ENVIRONMENTAL VARIABLES USED AS INDICES OF THE CONCERN
5. Use of Natural Resources Loss of natural value, natural resources, and possible disruption of ecosystems: conservation interest, including public land management agencies, conservation oriented private groups, and outdoor recreation groups will consider these variables important. They reflect the degree to which the natural character of the land will be degraded by the project.	• aesthetic degradation • loss of natural habitat • loss of vegetative cover • dust (particulate) concentrations during construction • dust (particulate) concentrations during operation • net water physically available/water required for construction plus 10 years of operation
6. Land Rights Potential displacement of existing inhabitants; exclusion of future inhabitants: this perceptual aggregation supplies an index of total value of potential sites for inhabitation.	• inhabitants displaced • private land required
7. Economics Potential economic changes: this aggregation is intended to summarize the important economic changes that could occur as a result of deployment. It includes three classes of impact: a change in the number of jobs both locally and regionally; a change in the tax monies expended to support community services and the loss of revenue from the major remunerative activities currently occupying the lands in direction. Land owners, business people, and all other local and regional inhabitants will be affected by and interested in the ways these changes affect their financial status.	• jobs for local residents—construction • jobs for local residents—operation • change in public expenditures—construction • change in public expenditures—operation • agriculture production lost • mining revenues lost

Table 3.1-1. Impact aggregation(s) (concl.).

ANTICIPATED CONCERN	BASIC ENVIRONMENTAL VARIABLES USED AS INDICES OF THE CONCERN
8. Local Government Issues Potential change in social infrastructure is intended to summarize those factors responsible for supporting and changing the character and services of a community. The in-migrations are proportioned between people moving in to take up residence (and thereby acquiring a stake in the community) and people coming in as transient workers (traditionally with little regard for community well-being). The change in public expenditures is included here as well as in 7 because this change will largely be channeled into services and included as a part of the community.	• resident population in-migration-construction • resident population in-migration-operation • nonresident population in-migration-construction • nonresident population in-migration-operation • change in public expenditures—construction • change in public expenditures—operation • new housing units—construction • new housing units—operation
9. Public Safety Local concern for public safety: this aggregation combines concern for the dangers of the presence of nuclear materials nearby and the possibility of nuclear accidents.	• nuclear target concern • nuclear accident concern
10. Airways Impeded	• airways impeded (altitude restriction)
11. Archaeology	• archaeological effect—possible disruption of sites
12. Cement	• cement required
13. Energy	• electric energy and petroleum fuels
14. Noise*	• noise

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*Added in this supplement.

Table 3.1-2. Comparative data on sample MOBs, sample alert bases, and U.S. average

AREA	POPULATION PER SQ MI	AVERAGE ANNUAL POPULATION GROWTH RATE (%) (1970-1975)	AVERAGE ANNUAL EMPLOYMENT GROWTH RATE (%) (1970-1975)	UNEMPLOYMENT RATE (%)	INCOME PER CAPITA ($)	AGRICULTURAL OUTPUT PER ACRE ($)
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Alert Base 2	41	1.6	0.4	5.4	4,630	46
Alert Base 3	33	0.4	2.6	2.7	6,690	215
Alert Base 4	33	3.9	1.7	4.5	4,120	37
U.S. Average	60	0.9	1.7	7.0	5,850	79

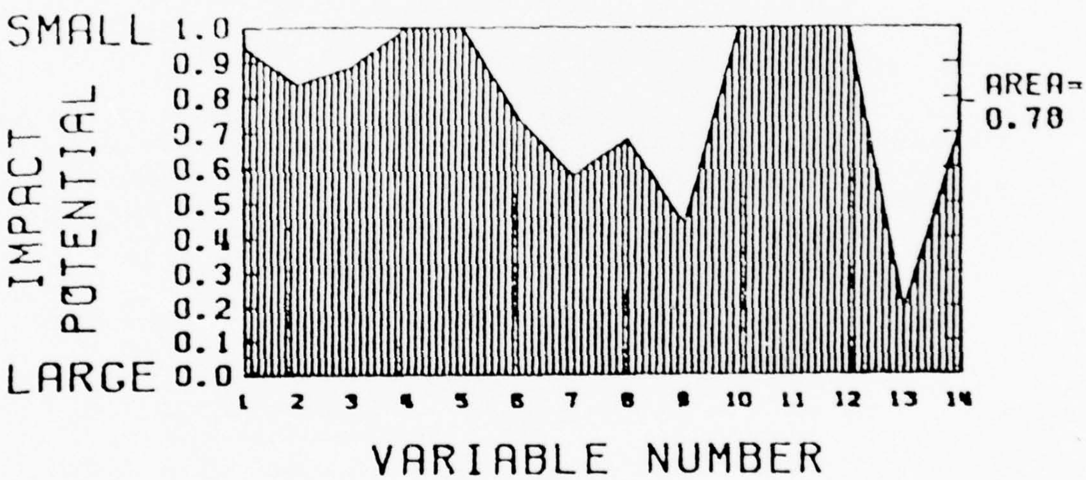
Table 3.1-3. System requirements by configuration.

CONFIGURATION ELEMENTS	STRUCTURE				
	TYPICAL		LOW COST		NO ALERT BASES
Missiles	240	200	240	200	200
Aircraft	AMST	WBJ	AMST	WBJ	WBJ
On Alert	240	100	120	100	100
Total Required	420	175	210	175	175
MOB	10	4	5	4	10
Alert Bases	69	30	35	25	—
PRIMARY FACTORS					
Fenced Area (mi^2) (km^2)	38.6	15.7	9.3	11.5	1.9
Disturbed Area (mi^2) Construction (km^2)	38.6	15.7	9.3	11.5	1.9
Cement $(10^3$ tons) $(10^3$ metric tons)	106.5	51	59.5	48.5	39.0
Water Construction $(10^9$ gal) $(10^6\ m^3)$	2.2	1.0	1.1	1.0	0.68
Water Construction +10 years $(10^9$ gal) $(10^6\ m^3)$	74.5	31.1	38.3	30.9	30.1
Asphalt $(10^3$ tons) $(10^3$ metric tons)	245.8	106.8	117.5	108.0	115.0
PCL Operations $(10^3$ tons) $(10^6\ m^3/yr)$	865	589	434	588	582
Frequency of Flight Operations $(10^3/mo)$	13.4	5.3	6.6	5.3	3.3
Operations Personnel (10^3)	34.9	14.4	17.8	14.4	14.4
Direct Labor Construction Personnel (10^3)	20.8	8.9	10.2	8.6	6.2

Using the primary factors, the SRM is used for each project configuration to produce impacts for each of the aggregated variables representing anticipated concerns. The 14 environmental variables and their associated impact potential are constructed as shown below to form a profile of the impact potential.

The area under this profile represents a gross indicator that allows a direct environmental comparison between project configurations. Each variable number represents a different environmental concern. The valleys represent increased impact potential relative to the other variables in the profile.

Profiles can be combined for various alternative configurations without affecting the independent nature of the variables.



1. INTERFERENCE WITH IMPORTANT SPECIES
2. AIR QUALITY
3. WATER QUALITY AND SUPPLY
4. ACCESS LOSS (RECREATION)
5. NATURAL RESOURCES
6. LAND RIGHTS
7. ECONOMICS
8. LOCAL GOVERNMENT ISSUES
9. PUBLIC SAFETY
10. AIRWAYS IMPEDED
11. ARCHAEOLOGY
12. CONSTRUCTION MATERIALS (CEMENT)
13. ELECTRICAL ENERGY
14. NOISE

3.2 IMPACTS COMMON TO ALL CONFIGURATIONS

Certain potential impacts of the Air Mobile basing mode alternative are to some degree independent of the specific site or project configuration. Population migration, noise, and energy requirements are examples. This section describes those impacts common to the Air Mobile alternative configurations used for this impact analysis. Later sections analyze impacts that are peculiar to each project configuration.

Socioeconomic Effects Common to All Configurations (3.2.1)

Modifications to existing USAF bases for support as an MOB have been estimated to cost $150 to $200 million (1977 dollars — the base year used in the FEIS). Assuming a two year construction period yields the annual investiment estimated to be $75 to $100 million (1977 dollars). This construction level will require 650-900 construction workers either supplied from the local labor force or imported to the region. The resulting economic activity stimulates other employment opportunities in the regional economy that are filled either by locally available people or new residents who relocate to the region. The number of indirect jobs and the number that must be filled by new regional residents is related to characteristics of the regional economy.

Operations at an MOB will require 3,500 to 6,000 personnel (including civilians). All military personnel are assumed to be new residents of the area while a portion of the civilians (dependent on the local economy) will be local hires and a portion will be new residents. Operating cost estimates are not available so the data in Table 3.2-1 have been assumed to estimate local economic stimulus.

Table 3.2-1. Estimates of local economic stimulus at the manning levels[1] (1977 $ in millions).

STIMULUS	BASE MANNING LEVEL	
	3,500	6,000
Total Annual Payroll[1]	38	66
40 percent of payroll spent locally[2]	15	26
Local Procurement[3]	5	5
Local Economic Stimulus	20	31

[1] At cost of $11,000 per manyear
[2] Based on national propensity to consume
[3] In a much larger economy, local procurement is assumed to be approximately $15 million per year.

The construction phase in all base areas had negligible or low impact potentials. At five of the six sample sites the studies indicated that there would be no measurable growth. All needs were met out of local resources. MOB 1 was the exception. It represents a small to moderate economy experiencing a $150 to $200 million construction project. All but about 100 direct and 1,000 indirect jobs would be filled by in-migrants to the region and could result in total population growth of 3,500 to 4,800 new residents in a region with 115,000 current residents. The growth related to the direct construction workers, who are known to travel long distances, could be less than noted. Many of them may not bring their families with them as assumed in the analysis.

Operations phase impacts on the economy, local government and population growth are found to be negligible on all the alert bases, within acceptable levels at MOB 2, but potentially severe (i.e. greater than 10 percent) at MOB 1 which has a relatively small economy. On all alert bases the operations phase involves essentially no change as most of the 90-120 personnel are assumed to be on rotation duty from the main operating bases. These transient personnel are not expected to interact with the local area population.

Probable Noise Effects Common to All Configurations (3.2.2)

Most of the noise effects which result from the operation of aircraft at and near Air Force bases are considered in the USAF's Air Installation Compatible Use Zone (AICUZ) program. This program was developed to deal with aircraft noise exposure and accident potentials. It is designed to encourage cooperative land-use planning in the vicinity of Air Force bases and to involve both the USAF and planning officials of the communities surrounding air installations. Noise level contours are calculated for aircraft expected to be flown at the base. The areas defined by the various noise level contours are then designated for compatible land use. For example, areas with high noise levels (greater than 70 L_{dn}) may be used for industrial development but are not suitable for residential use.

The following assumptions have been made to estimate the noise effects at MOBs and alert bases:

- Maximum number of flights — 30 per day at MOBs
- Minimum number of flights — 15 per day at MOBs
- Average number of flights — 1.5 per day at alert bases

- Two aircraft considered — C-5A and YC-15
- 70 percent of the flights occur in the daytime.

The single event noise descriptor, the Effective Perceived Noise Level, for a given aircraft is roughly common at all places provided that the aircraft, operating procedures, and environmental conditions remain the same.

For well-established airfields with annual operations of 10,000 events or more, the impacts based either on L_{dn} or AICUZ are not considered to be significant. This is because increased L_{dn} values of 1 dB to 3 dB would result from flight operations ranging from 400 to 800 per month. Since it is likely that the MOBs will be situated at existing major USAF bases, noise impacts on the AICUZ will be minor, if any. Typical MOB L_{dn} footprints for the maximum and minimum operations are shown on Figure 3.2-1.

For alert bases, the maximum number of operations is about 1.5 per day. The potentially impacted areas range from about 2.5 to 10 mi^2. For any airfields to be constructed for the project, the land uses in the adjacent area may be modified. The area of impact is considered to be minor since siting flexibility should allow avoidance of hospitals, schools, and other non-compatible activities.

For small airfields to be used for alert bases, the infrequent number of flights (1.5 per day) is too small to make any impact on the L_{dn} levels.

<u>Probable Biological Effects</u> (3.2.3)

Biological effects of air mobile basing are generally confined to the immediate environs of alert and main operating bases. Project impacts on important animal species and natural habitats in the Central CONUS fall into two categories: construction-associated impacts and operations-associated impacts. Potential construction associated impacts include removal of habitat and possible degradation of surface water through runoff of sediments and chemicals. Potential operations-associated impacts include noise impacts due to aircraft operation and possible pollution of surface waters from chemicals used for runway deicing and other base maintenance activities. Of these potential impacts, loss of habitat through construction activities is the principal unavoidable adverse effect; this could be mitigated by siting to avoid areas where habitat value is high and important species are present.

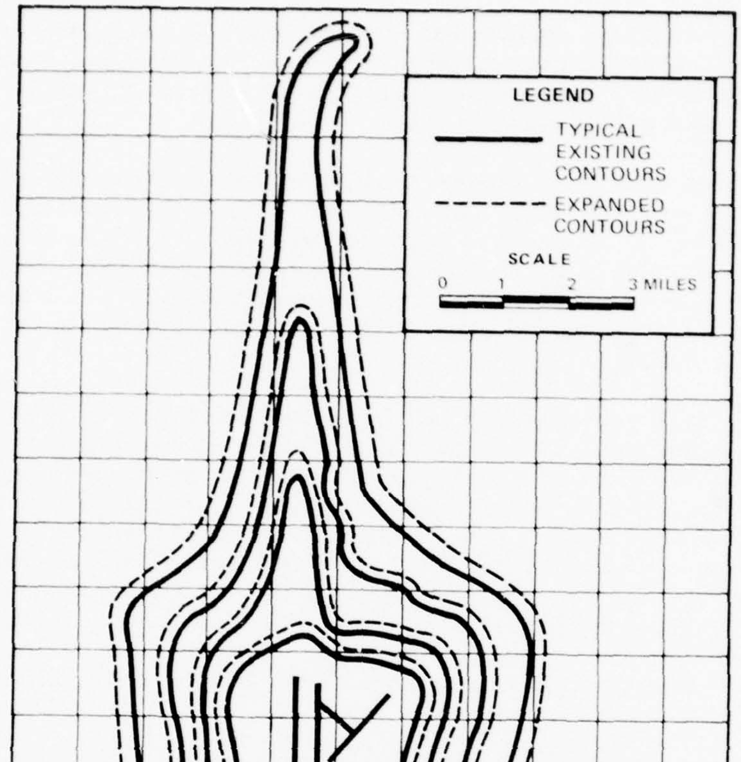


Figure 3.2-1. Typical MOB noise footprint.

Threatened and/or endangered species occur throughout the Central CONUS. Populations of these species tend to be scattered but found in discrete localities. Thus potential impacts can be mitigated by avoiding these areas during site selection.

Deployment of air mobile MX could require the removal of some land from public or private use. For example, construction of an alert base could require up to two square miles. Existing Air Force bases would be used for all MOBs and, to the maximum extent possible, for alert bases. Although new land requirements would probably not exceed an aggregate range of 20 to 50 square miles, actual requirements would be determined in FSED.

Construction and operation of air bases will have a small potential for surface water degradation throughout the Central CONUS. Construction related runoff can be controlled with such methods as berm construction around the area to be disturbed and use of settling ponds for containment of spills and runoff. Runoff of nutrients (urea for ice control on runways) and toxic chemicals have the potential for impacts on water and vegetation near any base. Judicious use of such compounds in addition to runoff containment and control methods will reduce or eliminate the impact. In many areas, the contribution by local agriculture to chemical and nutrient runoff may exceed what might be associated with base operations.

At MOBs, induced population growth could produce impacts on natural resources in several ways. Increased numbers of people will place additional demands on sewage treatment facilities and increase the volume of sewage discharged in the area. If existing or planned capacity at local treatment plants is not adequate, new or expanded facilities will have to be provided to meet the demand.

Other potential impacts of induced population growth relate to construction of housing and other facilities (shopping centers, etc.) for these people. The level of impact will depend upon the location of the MOB relative to urban areas, the size of these urban areas, and the presence of natural areas nearby. Potential impacts to natural resources would be lower if the MOB were located in or near a large urban area than if it were located near a small urban area. The absence of natural areas where housing might be built would also reduce the potential for impact.

There will be no significant induced growth effects on natural resources at alert bases.

Probable Air Quality Effects Common to All Configurations (3.2.4)

The project aspect which is common to the issue of air quality at a main operating base or alert base is the increase in aircraft operations. The primary emissions from jet aircraft and transportation vehicles are nitrogen oxides (NO_x), carbon monoxide (CO), and hydrocarbons (HC).

The emission factors available for the candidate aircraft used in the aircraft emission computations are given in Table 3.2-2. The carbon monoxide (CO) and hydrocarbon (HC) emissions are computed at engine idle and the nitrogen oxides (NO_x) at takeoff settings (this assumes worst case as emission rates are maximized at these settings).

Multiplying the factors by the estimated fuel used in the immediate base flying areas results in an estimate of the annual increase in emissions due to the addition of Air Mobile aircraft (Table 3.2-3). This fuel consumption scenario assumes that approximately 15 percent of the fuel consumed annually is used to support the activity at a MOB.

Using the per capita emissions for MOB 1 of 329 kg for carbon monoxide (CO), 51.1 kg for nitrogen oxides (NO_x) and 31.7 kg for hydrocargons (HC), and a population of 59,349, typical values of 19.5 x 10^6, 3.04 x 10^6, and 1.88 x 10^6 kg/yr, respectively, can be derived for the baseline. Comparative analysis (see Table 3.2-3) shows the Air Mobile contribution to be a minimal fraction of the baseline.

Probable Water Availability Effects Common to All Configurations (3.2.5)

Water availability has been considered in terms of the construction and the operations phases for main operating and alert bases. The potential impacts differe considerably between construction and operation for these two types of bases. For MOBs, the largest water consumption occurs during the operations phase, and is sensitive to the

Table 3.2-2. Emission factors for jet aircraft[1]

AIRCRAFT	ENGINE	CO	NO_x	HC
		(LB/1,000 LB FUEL)		
YC-14	CF6-SOE	76	37	30
YC-15	JTBD-17	35	19.2	10.1
C-5	TF39-GE-1	67	29	23

[1] CES, AMST (C-1XA) AFSC, 1 Sept. 1977.

Table 3.2-3. Aircraft emissions for local and training flights.[1]

AIRCRAFT (ENGINE TYPE)	POLLUTANT	EMISSIONS LB/YR	(Kg/YR)
C-5 (TF39-GE-1)	CO	2.3×10^5	(1.05×10^5)
	NO_x	9.9×10^4	(4.5×10^4)
	HC	7.8×10^4	(3.5×10^4)
YC-15 (JT8D-17)	CO	2.1×10^5	(9.5×10^4)
	NO_x	1.1×10^5	(5×10^4)
	HC	5.9×10^4	(2.7×10^4)
YC-14 (Cf6-50E)	CO	4.3×10^5	(2.0×10^5)
	NO_x	2.2×10^5	(1.0×10^5)
	HC	1.8×10^5	(8.2×10^4)

[1]Fuel used for AMST ACFT = 3.4×10^6 lb/yr (1.5×10^6 kg/yr)
(4.8×10^5 gal/yr)

Fuel used for WBJ (C-5) = 5.9×10^6 lb/yr (2.7×10^6 kg/yr)
(8.4×10^5 gal/yr)

number of in-migrating (new) personnel who will create new water demands. By contrast, the construction phase of an alert base creates a larger demand than the operation phase; these bases are isolated from the surrounding region, only onsite requirements for a limited number of people need be supplied, and there is essentially negligible induced offbase use.

MOBs will require about 500 to 600 acre-ft/yr of water for construction over a two year period. Reserves of this amount will generally be available at existing Air Force bases. Operations will require approximately 900 to 1,600 acre-ft/yr of water, both for onbase use and to supply induced offbase demand. The induced offbase demand is a function

of the ability of nearby communities to provide personnel, services, and facilities responsive to the needs of the expanded base activities. The following broad generalities apply:

LOCAL POPULATION	POTENTIAL IMPACT
200,000 or more	small
100,000 - 200,000	site dependent
Less than 100,000	likely, but may represent a distribution problem rather than a fundamental availability problem

Construction of an alert base is estimated to use less than 200 acre-ft/yr of water, and operation less than 10 acre-ft/yr. These demands should present no significant problems in the general study area. Even in the most water-regulated states, water rights acquired with the land should be adequate for operations. Construction could require temporary purchase of water, but most of the study area is expected to have sufficient water to make this unnecessary unless purchase is more cost effective than onsite development.

Probable Land Right Effects Common to All Configurations (3.2.6)

The land rights issue includes potential impacts on people living on project lands, people who own project lands, current uses of the land, and potential future uses of the land. Air Mobile MX will require limited amounts of additional land. These requirements range from no additional land (at an existing military base used for an alert base) to about 2 mi^2 of additional land (where an entirely new alert facility is required). Where no additional land is required and no significant change in noise contours occurs, there should be no significant land rights effects. The amount of land required and its location are issues that will be studied during FSED.

The potential Air Mobile deployment area is generally agricultural and most land requirements will involve agricultural lands. At the extreme (70 all new alert bases requiring 2 mi^2 of land), up to 140 mi^2 of prime agricultural land could be required but, although exact areas will not be defined until siting studies, the real requirement for prime farmland is likely no more than 20 to 50 mi^2 and probably less.

Almost all potential air mobile MX project lands are privately held, under federal ownership and DOD control, or owned by municipalities. Special interest public lands such as national parks, wildlife refuges, and Indian reservations have been excluded from consideration.

Most potential project lands will have at least a few residents. Agricultural lands to the eastern side of the study area are characterized by scattered farm houses. While the spacing between homes generally increases to the south and west, it is unlikely that many uninhabited areas 2 miles long and 1 mile wide can be located. Where the project will be colocated with existing airstrip facilities, the number of people impacted will be reduced since such areas are generally very low density areas. In a few cases, it might be necessary to expand existing runways and thus impact residents of adjacent lands. Such requirements will be minimized but may not be entirely avoidable. In low population density areas, an average of 5 to 10 people per mi^2 and in higher population density areas, an average of 10 to 20 people per mi^2 may be affected.

Probable Archaeological Effects Common to all Configurations (3.2.7)

There is a great deal of variability in the density, diversity, and degree of preservation of archaeological resources in the study region. It is likely that some areas 2 mi^2 or more in size would contain some archaeological sites. In most cases adverse effects on these sites can be reduced or eliminated through minor project modifications or implementation of data recovery programs to recover resources from sites that cannot be avoided.

Effects on archaeological resources are highly site specific. Due to a lack of reliable archaeological data covering a large portion of the study area, only probable effects can be considered until siting studies are performed during FSED. Construction activities, in general, product adverse effects on cultural resources. In agricultural land, it is probable that adverse effects would occur when large archaeological sites with deep accumulations of cultural remains were located within a siting area that had been previously cultivated.

On grazing land and other areas where there has been less surface disturbance, there is a higher probability that the archaeological resource base is largely intact. Such land areas tend to be in the western portions of the study area. A wide range of archaeological remains is expected to occur in such contexts. While the potential for impacting archaeological resources is greater here, it is still probable that 2 mi^2 areas of relatively low archaeological sensitivity do exist. Thus, in this less disturbed area, it is probable that careful choice of siting areas can minimize adverse impacts on archaeological resources.

Probable Effects on Construction Resources Common to All Configurations (3.2.8)

Air mobile construction will require direct labor, cement, asphalt, and steel. However, while all areas except the MOB 2 region have

relatively small-sized, agriculturally based economies, no large market dislocations are anticipated. Localized delays of shipment, and short run price increases equal to the transport cost differential of resource importation represent the most serious adverse impacts.

- Labor. MOB construction should require 650 to 900 workers over a two year period based upon construction labor requirements estimated from cost projections and assumed construction schedules. Construction of an alert base may require 150 to 170 workers while modifications to existing facilities, either civilian or military will require 60-80 workers for one year. Only the MOB 1 effects area and comparable small economies where a main operating base is introduced are expected to have insufficient construction labor, thus, requiring in-migration. Other regions could readily assimilate construction labor demands without any labor in-migration.

- Cement. MOB construction is not expected to generate large cement demands, given extensive use of asphalt rather than concrete. Largest cement requirements will result from additional facility slab floors. Cement requirements were estimated assuming construction of six large facilities including two aircraft hangers. Estimating surface requirements of 924,000 ft^2 and assuming a slab thickness of 9 in., approximately 7,000 tons of concrete would be demanded for MOB construction. Defining the radius of influence for cement as the state containing the construction site, all estimated project demands could be increased by a factor of ten before any of the directly affected states' cement plants approached their 1974 capacity levels.

- Asphalt. Establishment of an MOB at an existing USAF base is expected to require some construction. Based upon the analysis of the extreme case for MOB construction asphalt demands, construction of two 100 ft by 10,000 ft runway overlays 5 in. thick, estimates of construction requirements were found equal up to as much as 5,000 tons of asphalt. All construction effects areas, with the exception of MOB 2 have very little or no asphalt industry in the immediate area. However, the realistic supply areas are the Petroleum Administration for Defense (PAD) districts in which large regional supplies relative to particular construction demand exists. In all sample construction projects, estimated asphalt requirements comprised no more than 0.1 percent of the directly affected PAD district's 1974 production. Demands could be increased by a factor of twenty, yet still comprise a negligible portion of the asphalt produced within each district.

- Other Resources. MOB construction is expected to require steel for structural reinforcement and for actual building. The demands for steel and other construction resources are expected to be large enough to generate impacts common to the sample areas. Local economies may be unable to satisfy these demands. Consequently, importation is likely to be required, possibly resulting in short run price increases and supply delays. Preliminary analysis indicates such problems would be minor.

Potential Electrical-Energy-Related Effects Common to All Configurations (3.2.9)

Electrical power required for construction and operation of a main operating base is essentially independent of base location, and has been estimated at 11 megawatts (MW) for the construction phase, and 27 MW for the operations phase. Similarly, power demand for an alert base has been estimated at 5 MW for the construction phase, and 0.4 MW for the operations phase.

The total demand for each type of base is not completely site-independent, because additional demands may be generated by in-migrating people. For an MOB, this factor can range up to 1.6 MW for the construction phase, and from 85 to 98 MW for the operations phase. For an alert base it can range up to 0.1 MW for the construction phase, and does not exist for the operations phase.

The potential effects of electrical demand are not uniform over the entire siting area, but are reasonably uniform over Electrical Reliability Council areas, as shown in Figure 3.2-2. The reliability areas that could be impacted are:

MARCA: Mid-Continent Area Reliability Coordination Agreement

WSCC: Western Systems Coordinating Council

MAIN: Mid-America Interpool Network

SWPP: Southwest Power Pool

ERCOT: Electrical Reliability Council of Texas

These areas represent regions within which interconnection agreements exist among cooperating electric utilities, so that shutdowns for maintenance, or failures in one utility's generating capacity can be compensated for by deliveries from other utilities. All cooperating

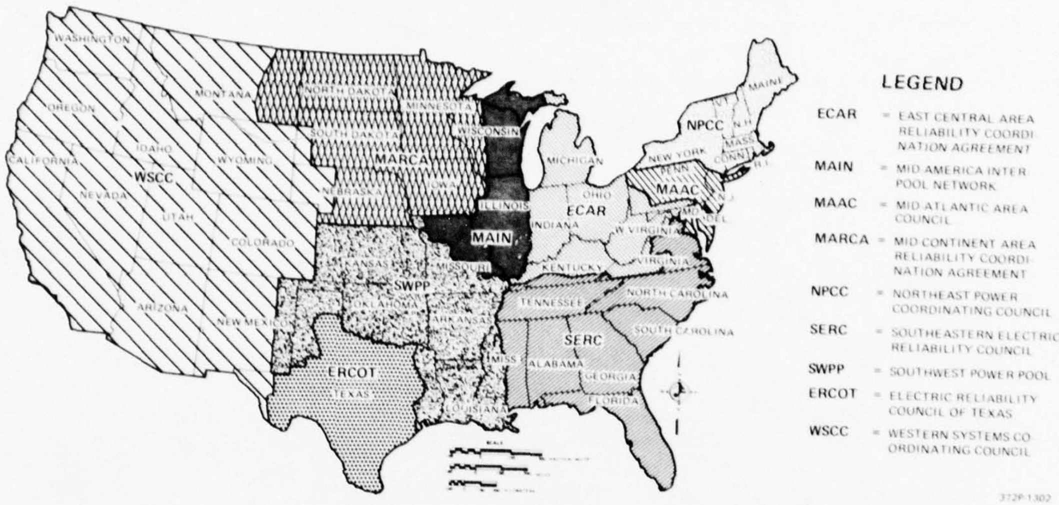


Figure 3.2-2. Regional electric reliability councils.

utilities are expected to maintain a 15 percent reserve margin as an absolute minimum. The reserve margin is defined as available peak generating capacity in excess of peak load; percent margin is obtained by dividing this value by the peak load. Peak loads for all the areas under consideration occur in the summer months.

The National Electrical Reliability Council (NERC, 1978) and the Federal Power Commission (FPC, 1977) have published projected supplies and demands, from which reserve margins can be calculated. Reserve margin projections for 1983 (an assumed construction year) and 1987 (an assumed operational year) are shown in Table 3.2-4.* These projections are likely to be optimistic in view of present delays in siting

*These years are taken as typical, and should not be assumed to represent planned initial or final operational capability dates for the MX system.

Table 3.2-4. Summer reserve margin projections for regional electrical reliability councils, MW (percent).

REGION	1983	1987
MARCA[1]	6,401 (23.6)	5,148 (15.3)
WSCC[1]	34,003 (35.2)	41,213 (35.7)
MAIN	13,566 (30.0)	9,550 (17.3)
SWPP	11,494 (21.6)	15,391 (22.9)
ERCOT	12,080 (32.3)	9,050 (19.7)
TOTALS U.S.	164,050 (29.3)	176,079 (25.8)

[1]Includes both U.S. and Canadian contributions
National Electric Reliability Council, 1978

and construction of the projected generating capacity, and the fact that present load forecasts are susceptible to increase if the postulated goals of the proposed National Energy Plan are to be achieved (NERC, 1978). The possible extent of the problem is shown by an assessment of the potential effect on reserve margins published by the Federal Power Commission (FPC, 1977), based on assessments by the Nuclear Regulatory Commission (NRC), of possible delays in nuclear power plant construction. The potential extent of the problem is shown in Table 3.2-5.

Table 3.2-4 shows that if the NERC projections are in fact met, the MARCA area, which constitutes a major portion of the North Central study region will have very small (0.3 percent) reserve over the desirable 15 percent limit in 1987. The situation will be even less favorable if anticipated delays occur in installation of additional capacity. The FPC data of Table 3.2-5, for example, indicate a potential substantial deficit in the minimum 15 percent reserve margin, and only a small (1.4 percent) margin over anticipated demand in 1986. By contrast, the WSCC region is projected to have much higher reserve margins than MARCA, both in absolute amounts and in excess of the 15 percent reserve, under either set of projections.

Table 3.2-5. Possible reduction in reserve margins due to nuclear delays, absolute minimum and consequent surpluses/deficits from 15 percent absolute minimum.

1986 SUMMER RESERVE MARGIN, PERCENT

COUNCIL	COUNCIL PROJECTION 1977	IF NUCLEAR UNITS FOLLOW NRC PROJECTION
MARCA	13.5 (1.5)	1.4 (-13.3)
WSCC	29.0 (14.0)	21.7 (6.7)
MAIN	14.4 (-0.6)	10.1 (-4.9)
SWPP	16.3 (1.3)	11.9 (-4.0)
ERCOT	22.7 (7.7)	20.0 (5.0)
TOTALS		14.9 (-0.1)[1]

[1] This reserve level is considered too low for reliable and adequate power supply, nationally FPC 1977.

REFERENCES

Federal Power Commission, Bureau of Power Staff Report, 1977.

Electric Power Supply and Demand 1977-1986 as projected by the Regional Electric Reliability Councils, May 16, 1977.

National Electrical Reliability Council, 1978. 8th Annual Review of Overall Reliability and Adequacy of the North American Bulk Power Systems. August 1978.

3.3 IMPACTS OF ALTERNATIVE AIR MOBILE CONFIGURATIONS

Five air mobile configurations selected for analysis are listed in Table 1-1 of Section 1.1. These configurations were designed to cover the ranges of types and numbers of missiles, aircraft, main operating and alert bases which could constitute the air mobile missile force. Dispersal sites have not been included in the analysis as no significant construction or routine operation is planned for these sites at this time.

Two main configurations have been considered, typical and low cost. Typical configurations employ all three potential types of alert bases; existing military, existing civilian and new bases to be specifically constructed for air mobile. The existing bases would be on a co-use basis. Low cost configurations eliminate construction of new bases and assume use of existing bases only.

The fifth configuration has no alert bases and employs existing major Air Force bases to handle the alert functions. There are fewer of these larger bases serving as alert bases and they have more aircraft on an alert status per base than the smaller alert bases of the other configurations.

The typical and low cost configurations consider use of WBJ or AMST aircraft. Only the WBJ is considered for the no alert base configuration as this option crowds alert aircraft on a base. Fewer aircraft are required with the WBJ option which carries two missiles per plane rather than one per AMST.

All configurations should have roughly equal operational performance with the possible exception of the fifth configuration which places alert aircraft at main operating bases only. This configuration limits the number of bases required by placing ten aircraft on alert at each base rather than the two to four aircraft planned for the smaller alert bases.

All configurations include both two-aircraft and four-aircraft alert bases and provide for two-aircraft bases along the margins of the deployment area, nearer the coasts, and four-aircraft bases closer to the interior of the siting zone where the reaction time is longer.

AMST Typical (3.3.1)

The force elements of the AMST typical configuration are summarized in Table 3.3-1. This configuration employs a single missile per aircraft with a total of 240 missiles in 240 operational aircraft and a total of 420 AMST aircraft. These numbers are near the upper end of the range of numbers considered for the project. Ten main bases will be used to support the missiles and aircraft with eight main bases for aircraft only, resulting in 24 operational aircraft supported by each main operating

Table 3.3-1. Elements of the AMST typical configuration.[1]

CONFIGURATION ELEMENT		AMST TYPICAL	ELEMENT SUMMARY
Missiles	Total	240	240
Aircraft	Alert Aircraft Reserve Aircraft	240 180	420
MOBs	Missile & ACFT Support Aircraft Support Only Alert Function Only	2 8 —	10
Co-Use Military Alert Bases	4 ACFT/0 New Runway 4 ACFT/1 New Runway 4 ACFT/2 New Runway 2 ACFT/0 New Runway	20 10 — 10	40
New Alert Bases	4 ACFT/1 Runway 4 ACFT/2 Runways	15 5	20
Co-Use Civilian Alert Bases	4 ACFT/0 New Runway 2 ACFT/0 New Runway	7 2	9
Alert Base Total (Co-Military + New + Co-Civilian)			69

[1]Representative range of system parameters.
(Subject to refinement in FSED).

base. Sixty-nine alert bases would be required which is near the upper end of the range of numbers of alert bases under consideration. This results in alert bases with two to four aircraft and seven alert bases distributed among co-use civilian, co-use military and new construction.

The profiles of impact potential developed in the parametric impact analysis of the AMST typical configuration are shown in Figures 3.3-1. The first figure summarizes the overall impact the overall impact potential of the AMST typical configuration. The next five figures address impact potential at the MOBs, at each of the three types of alert bases, and at the combination of all alert bases.

Overall, this configuration appears to have a moderate impact potential. Of the environmental issues investigated, energy, public safety and noise show moderately large impacts; land rights, economics and government issues show moderate impacts; while the remaining eight variables show small impacts. The availability of electric power from commercial sources could become a major issue. Noise impacts are also considered moderately large, although such impacts are expected to be concentrated at the main operating bases (Figure 3.3-2) where a larger population is expected to be exposed to high noise levels. Public safety is the third environmental issue showing relatively higher impacts. The level of public concerns on safety issues is moderately large. Activities at the MOBs may cause concern because of the higher level of activity and the proximity of potential MOBs to large urban areas. Concern is also likely to result from construction of new alert bases and the co-use of existing civilian airfields. Such facilities will be highly visible to the public and may cause concern among residents of the area.

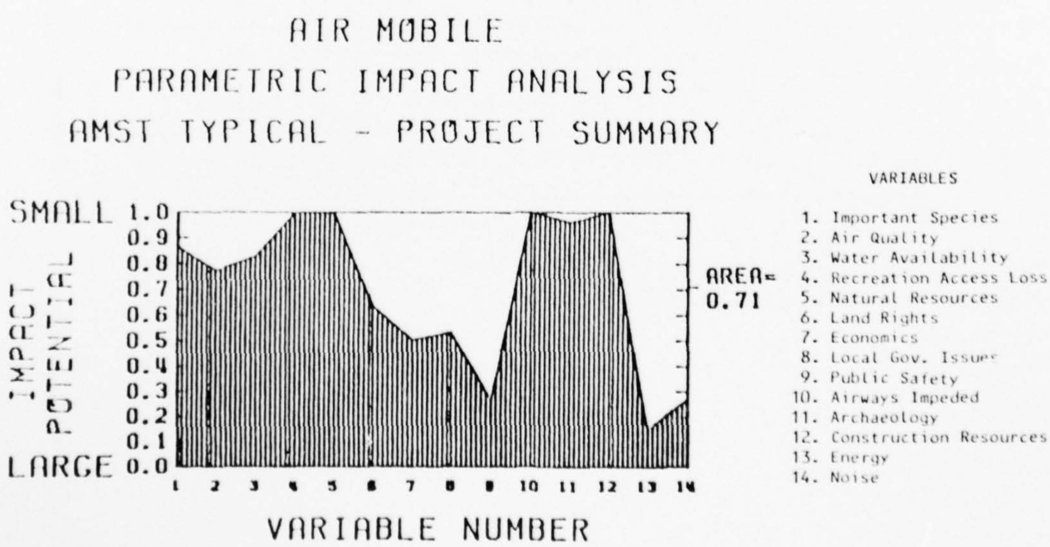


Figure 3.3-1. Air mobile parametric impact analysis AMST typical-project summary

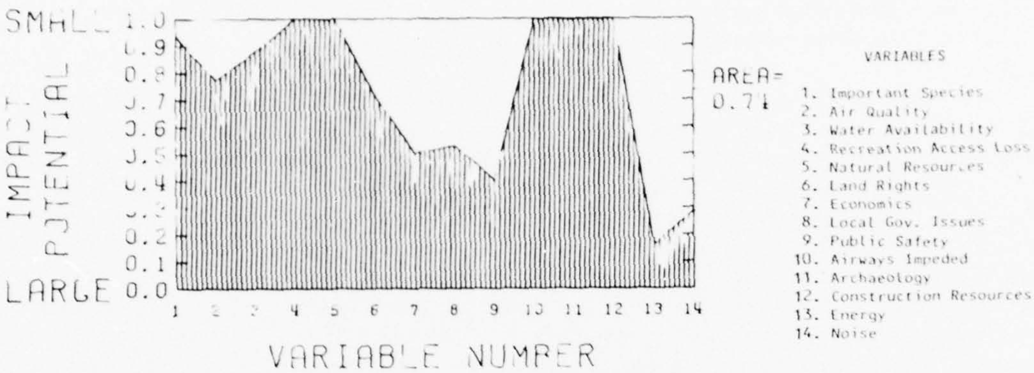


Figure 3.3-2. Air mobile parametric impact analysis AMST typical — MOB summary.

Economic and local government issues along with the land rights issue show moderate impacts under this configuration. The overall assessment of a moderate impact on economic and local government issues stems from the possibility of large scale in-migration of project-related workers and their families at those MOBs which are located in sparsely populated areas with small economies. In such locations the beneficial effects of generating jobs for the locally unemployed persons are tempered by the possible inflationary effect of "reducing" the unemployed pool. In addition, the inmigration of persons results in increased demands for housing and additional public expenditure required to provide the necessary infrastructure for the additional population. The land rights issue is affected by the possible relocation of inhabitants from lands which might be acquired for the construction, expansion or modification of alert and main operating bases. Although such a relocation may be relatively small, it has the potential for controversy detrimental to the project. The issue is further compounded by the possibility of the the loss of prime agricultural land in some areas.

Issues related to interference with important species, air quality, water availability, recreation access loss, loss of natural resources, archaeology and construction resources show small impacts. However, many of these issues are site-specific and significant impacts upon protected species and important wildlife habitats can be largely avoided by siting.

For the increases in emissions projected in association with the ten main operating bases, the impact potential is low at each MOB meaning that their contribution to baseline pollutant emissions could not be readily differentiated from the contribution of existing sources. Construction-related emissions amount to about 1.0 percent of the operations-generated pollutants and are not large enough as presently projected to cause measurable effects on air quality.

The impact potential of this configuration on Land Rights is considered to be moderately large. The ten proposed main operating bases (MOBs) will require land for construction of facilities commensurate with their function as either a missile/aircraft support or aircraft support only MOB. Additionally, construction of 20 new alert bases could require as much as 35 mi^2 of land which, in turn, may result in the loss of some prime farmland. Potential displacement of inhabitants is the primary component of the Land Rights issue creating an impact. Due to limited requirements, the other two components of Land Rights, Private Land required and Prime Farmland Lost, had very small impact potential ratings.

Economic impact potentials may be moderate for both construction and operation. The beneficial effect of generating jobs for the unemployed was tempered by the possible inflationary effect of "using up" the unemployed pool. The change in public expenditures is moderate-to-large in construction and operations, and agricultural loss is minor.

Economic impacts exist at the main operating bases, particularly for the project manning due to relatively small available labor pool. The summary project impact potential for this configuration (Figure 3.3-2) was the highest (least acceptable) of all five configurations analyzed in terms of local economic issues.

The impacts of this configuration on local government issues are estimated to be moderate. The local government issues are governed by the level of in-migration of construction and/or operations workers and their dependents at any given base. This results in in-migration results in increased demands for housing and additional public expenditure required to provide the necessary infrastructure for the additional population.

The in-migration of workers is confined to the main operating base (MOB) locations where the direct labor requirements for construction range from 1,100 to 1,400 and the operations phase demand reaches as high as 3,800 workers. Some of the Air Force bases which may be used as MOBs are located in sparsely populated areas and do not have sufficient labor force available within their respective labor market areas defined as a region within 60 mile commuting distance from the base. This necessitates the in-migration of people from other parts of the country, triggering impacts on local government and infrastructure.

In addition to the establishment of 10 main operating bases, this configuration requires the construction of 20 new alert bases and the co-use of 49 other military and civilian airfields. The labor requirements for the construction or modification of the alert bases are relatively small, ranging from 59 to 225 construction workers. The operations worker requirements are almost negligible since all personnel are expected to be on rotation duty from the MOBs (Figure 3.3-3). Such a small demand for labor can be met in almost any location by the locally available labor. With no importation of labor required, there would be no requirements for new housing or additional public expenditure.

The cumulative impacts of establishing ten main operating bases and 69 alert bases are larger than the sum of impacts on individual bases. This is because the labor market areas for individual bases overlap reducing the probability of obtaining significant labor force from the local areas. The net result is a lower ranking on the potential impact scale than would be expected if interactions are not examined.

Public Safety concerns involve the potential hazards which may result from MX activities and the public perception of that hazard. (See Figure 3.3-1 above.) Depending upon public response to the project, the perceived hazard may be greater than indicated by an objective safety analysis. Because of its high public visibility, the impact potential of safety issues is moderately large (Figure 3.3-4).

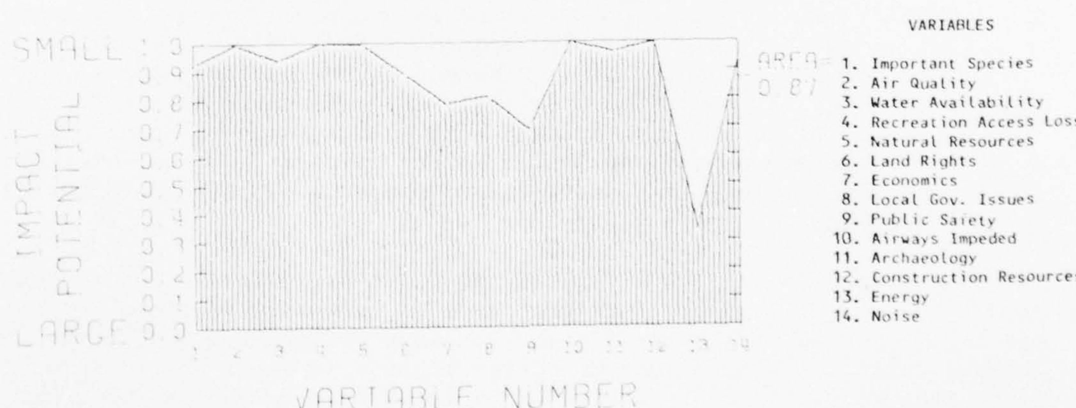


Figure 3.3-3. Air mobile parametric impact analysis AMST typical — alert summary.

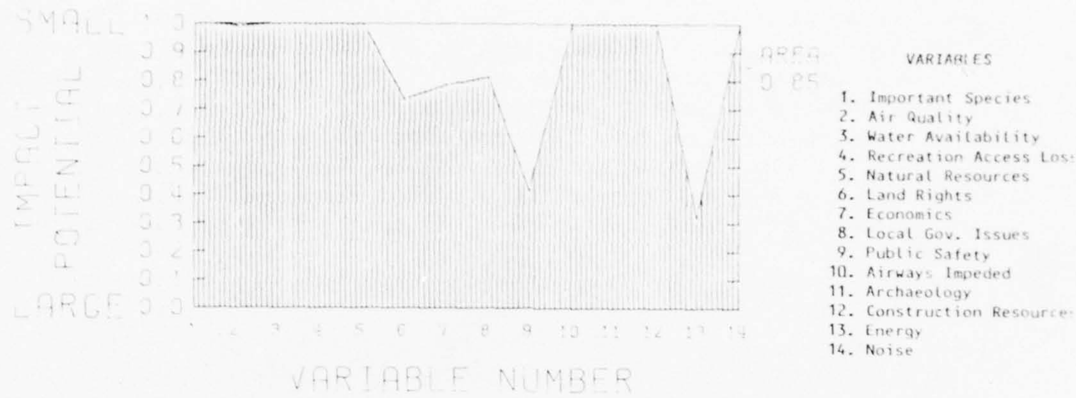


Figure 3.3-4. Air mobile parametric impact analysis AMST typical — CO-CIV alert.

Activities at the MOBs may cause concern because of the higher level of activity and the proximity of potential MOBs to urban areas. The proximity of the MOBs to high population density areas will also increase the potential hazards associated with MX activities. The greater number of flight operations at the MOB for transportation of fuel, missiles and missile components, plus the greater extent of storage and handling of these materials will result in greater hazard potentials at the MOBs than at the alert bases. The hazards will be eliminated or controlled by strict adherence to nuclear design safety criteria. Co-use military alert bases will likely have small safety concerns compared to other base types considered (Figure 3.3-5).

The archaeological impact potential for this configuration is small. This is due largely to the fact that impacts were assumed to be sufficiently dispersed over a large area that they would not be additive. However, this force structure would result in a total of almost 30 mi^2 being disturbed. There is a high probability that some archaeological resources would be encountered. As a result of construction of 20 new alert bases (disturbed area 20 mi^2) 40 co-use military alert bases (7 mi^2) and 10 MOBs (2 mi^2) no surface disturbance would result at the nine co-use civilian bases.

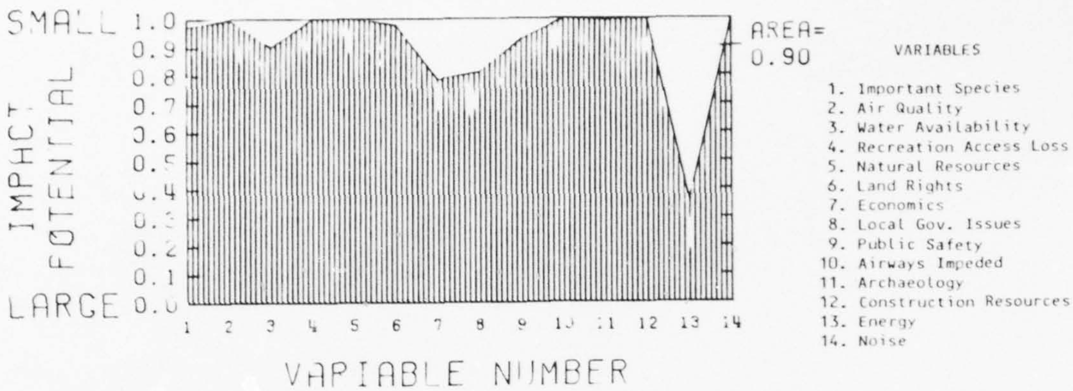


Figure 3.3-5. Air mobile parametric impact analysis AMST typical — Co-Mil Alert.

Construction resource impacts are estimated to be completely acceptable (impact potential equals 1.0) for a force size of ten main operating bases (MOBs) and 69 alert bases. Important construction inputs are cement and asphalt, and while there is a large variation in project requirements across the MOB-alert base configurations, all resource requirements are estimated to comprise a relatively small share of available regional supply.

Asphalt requirements are a function of construction of runway extensions and overlays, taxiways and aprons, and road construction/modification. Asphalt requirements are estimated to equal 11.5 x 10^3 tons for each of the MOB configurations, missile and aircraft support, and aircraft support only and result from the constant 5,000 foot runways necessary for the 420 AMST aircraft. Alert base requirements are dependent upon whether new or co-use alert bases are to be utilized. Of the 69 alert bases, 40 will be co-use military bases; 20 new no new runways, hence, the asphalt requirements of 1.0 x 10^3 tons are lowest of any base configuration. Most of the 20 new alert bases are expected to require one new runway for four AMSTs; asphalt requirements would be roughly 2.6 x 10^3 tons (Figure 3.3-6). No MOB or alert base asphalt requirements would generate serious demands large enough to create noticeable economic impacts.

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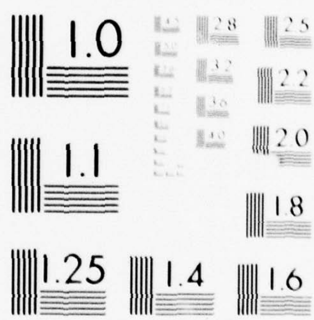


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

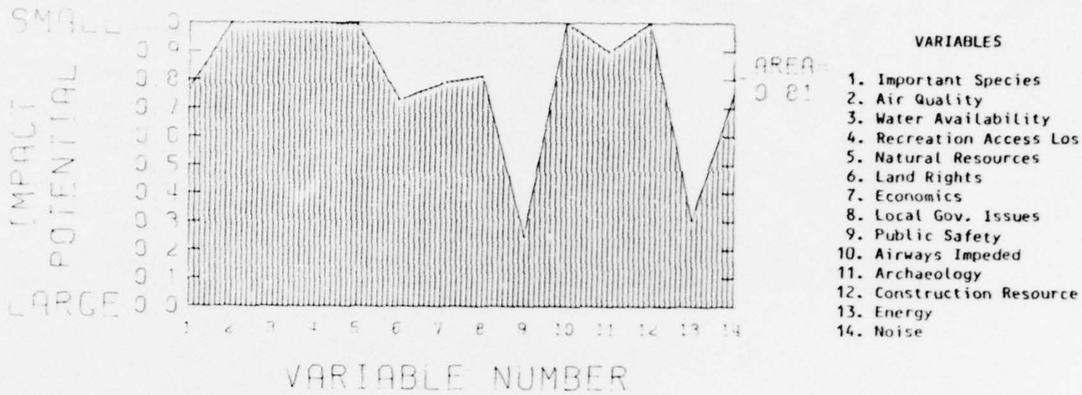


Figure 3.3-6. Air mobile parametric impact analysis AMST typical — new alert.

Demand for cement is not expected to be as large as might be indicated by the project size of 240 missiles and 420 AMST's, given the proposed extensive substitution of asphalt. Most cement required will be for facility slabs. Of the ten MOB's required by this configuration, cement demand will vary as numbers of proposed facilities vary. MOB's which are missile and aircraft support, require 12,000 tons of cement, while those requiring aircraft support, require 12,000 tons of cement, while those requiring aircraft support only, with fewer facilities, require only one-half as much. Alert base cement requirements remain constant at 500 tons; all require the same facility construction. All MOB and alert base cement demands are estimated to be completely acceptable.

Energy impacts are estimated to be large. Electricity demand for construction, the least acceptable component of energy, has been estimated in terms of total construction costs and induced population in-migration. Largest adverse electricity construction impacts result from this configuration's ten MOBs. Construction electricity demands at the missile and aircraft support MOBs are estimated to equal about 27 MW. Electricity demands for construction of the eight MOBs designated for aircraft support only are expected to be about 21 MW. Both sets of

demands, when compared to 1986 regional electricy reserves estimated by the National Electric Reliability Council, are estimated to have large impact potentials. Alert base construction electricity demands are expected to be greatest for the 20 new alert bases.

The impact of MOB alert base operations demands upon regional electrical capacity is moderate. Electrical operations impacts primarily result from MOB operations; increases both in the number of base personnel as well as project-induced population in-migration will increase operations electrical demands.

The noise impact potential reflects a moderate to large impact from MOBs and little impact from alert bases. Most of the impacts result from the relatively large number of flights conducted at MOBs that would ultimately expand the 65 L_{dn} noise contours. The result of the contour expansion may be to increase the number of complaints expected around the MOBs depending on location of sensitive receptors and existing conditions.

WBJ Typical (3.3.2)

The elements of the WBJ typical configuration are summarized in Table 3.3-2. This configuration employs two missiles per aircraft and a total of 200 missiles with 100 operational and 175 total WBJ aircraft. The number of missiles is reduced on the basis that the WBJs have a far larger payload than the AMST. Two MOBs support the missiles and aircraft and two additional MOBs would support aircraft only. The operational aircraft would number 167, with eight support aircraft. Each MOB would service approximately seven alert bases and 44 aircraft.

The profiles of impact potential developed in the parametric impact analysis of the WBJ typical configuration are shown in Figure 3.3-7.

Moderately large impact potentials for this configuration exist for energy use, noise impacts, and public safety issues (Figure 3.3-7). Noise and public safety impact potentials are larger at MOBs than at alert bases due to the size of the installation, the level of activity, and level of visibility to the public. New alert bases also show a moderately large potential for public safety impacts due to the perceived hazard likely to result from construction of a new facility of this type (Figure 3.3-8). This option has moderate impact potentials for issues related to local government, economic, land use, and air quality variables, largely as a result of impacts at the MOBs.

A relatively low impact potential to important species is associated with this configuration. (Figure 3.3-9) The low frequency and relatively small size of habitats in most of the Central CONUS region, where important species could be affected by this project action, results in a low probability of this occurrence.

Air quality impact for the typical WBJ configuration results from the primary emissions from the aircraft engines. The carbon monoxide (CO), nitrogen oxides (NO_x), and unburned hydrocarbons (HC) from the WBJ aircraft constitute a larger emissions load in the MOB area than home heating, vehicle exhaust, fuel handling and power generation emissions associated with induced population growth. However, total emissions associated with WBJ activities will not be large when compared with total MOB areawide emissions (Figure 3.3-10).

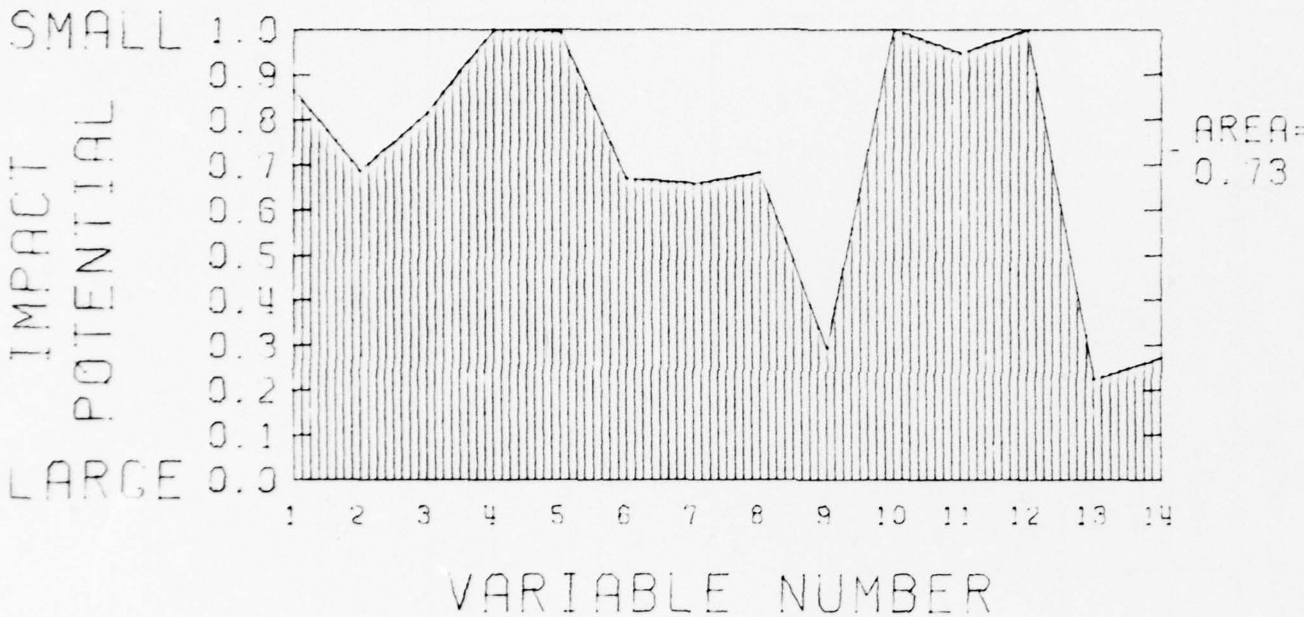
The 60 mi spacing between project installations substantially exceeds the 30 mi radius of influence of the MOBs and the 20 mi radius attributed to the alert base thus synergistic impacts are not anticipated.

The predicted level of potential impact on water availability is low. Individual MOBs could, however, have moderate impacts if sited in a water-scarce area.

Table 3.3-2. Elements of the WBJ typical configuration.[1]

CONFIGURATION ELEMENT		AMST TYPICAL	ELEMENT SUMMARY
Missiles	Total	200	200
Aircraft	Alert Aircraft Reserve Aircraft	100 75	175
MOBs	Missile & ACFT Support Aircraft Support Only Alert Function Only	2 2 0	4
Co-Use Military Alert Bases	4 ACFT/0 New Runway 4 ACFT/1 New Runway 4 ACFT/2 New Runway 2 ACFT/0 New Runway	10 3 0 8	21
New Alert Bases	4 ACFT/1 Runway 4 ACFT/2 Runways	5 2	7
Co-Use Civilian Alert Bases	4 ACFT/0 New Runway 2 ACFT/0 New Runway	0 2	2
Alert Base Total (Co-Military + New + Co-Civilian)			30

[1]Representative range of system parameters. (Subject to refinement in FSED).



VARIABLES

1. Important Species
2. Air Quality
3. Water Availability
4. Recreation Access Los
5. Natural Resources
6. Land Rights
7. Economics
8. Local Gov. Issues
9. Public Safety
10. Airways Impeded
11. Archaeology
12. Construction Resource
13. Energy
14. Noise

Figure 3.3-7. Air mobile parametric impact analysis WBJ typical — project summary.

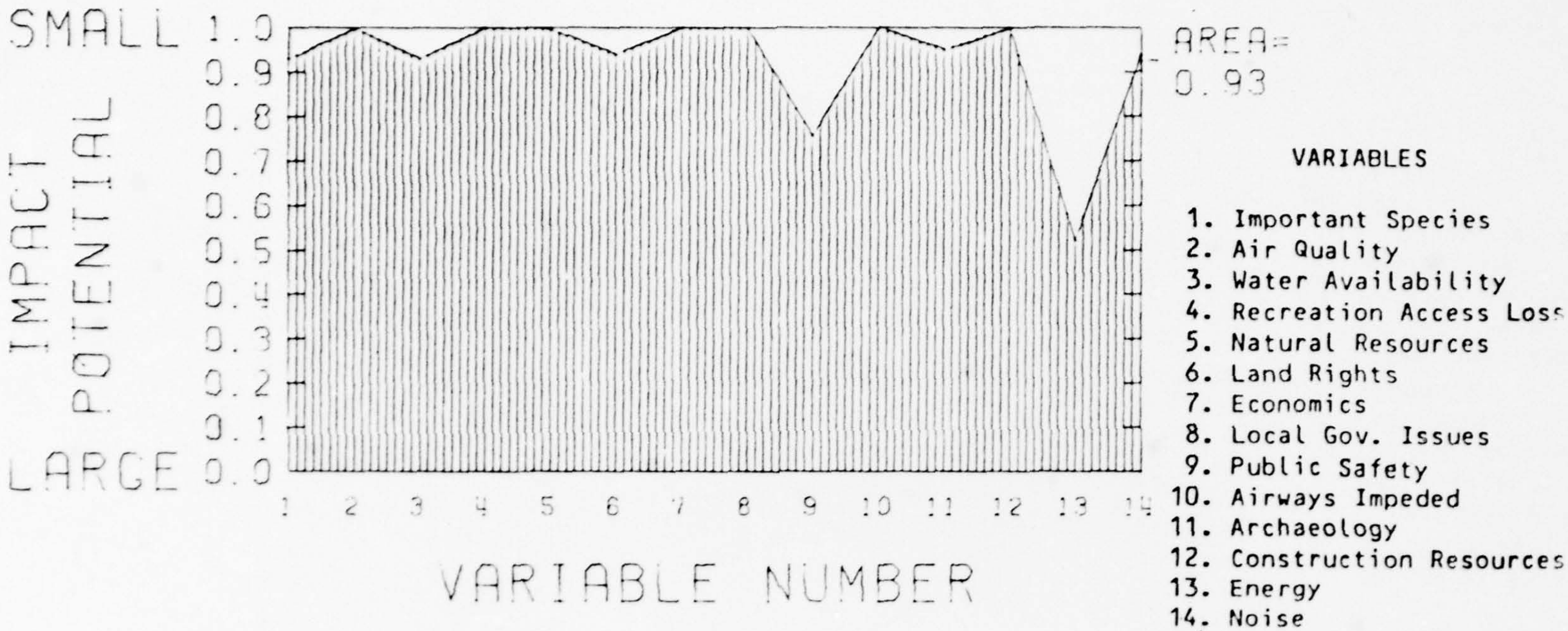
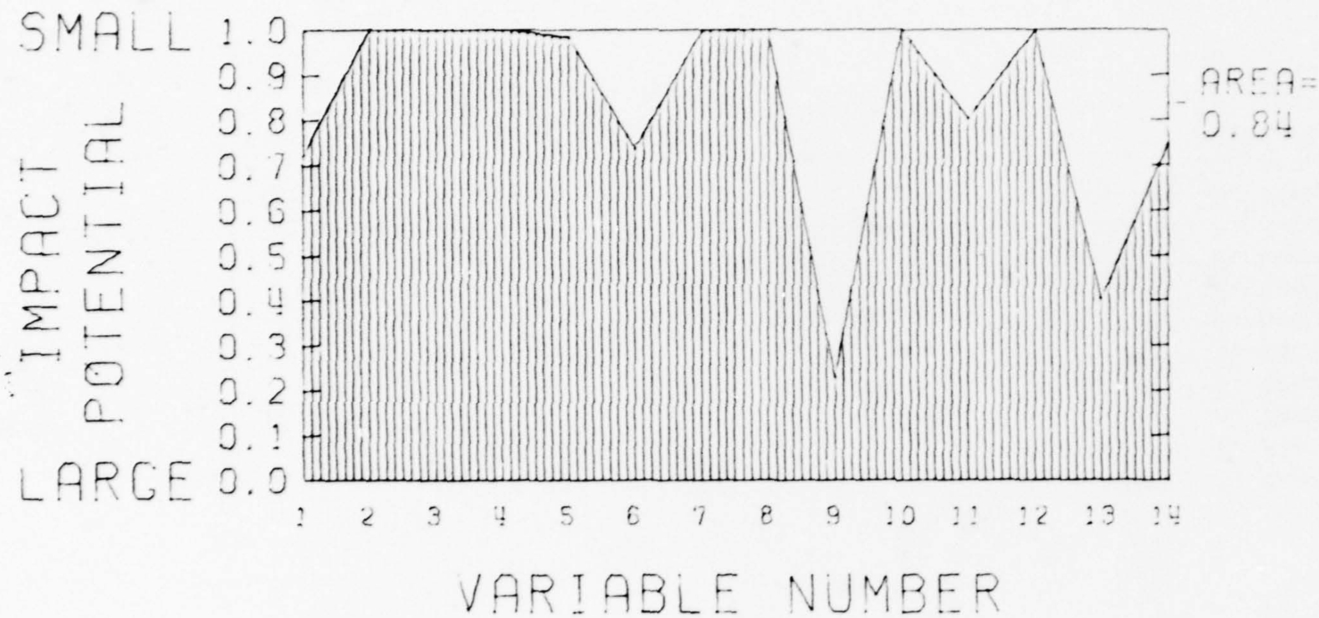


Figure 3.3-8. Air mobile parametric impact analysis WBJ typical — alert summary.



VARIABLES

1. Important Species
2. Air Quality
3. Water Availability
4. Recreation Access Los
5. Natural Resources
6. Land Rights
7. Economics
8. Local Gov. Issues
9. Public Safety
10. Airways Impeded
11. Archaeology
12. Construction Resource
13. Energy
14. Noise

Figure 3.3-9. Air mobile parametric impact analysis
WBJ typical — new alert.

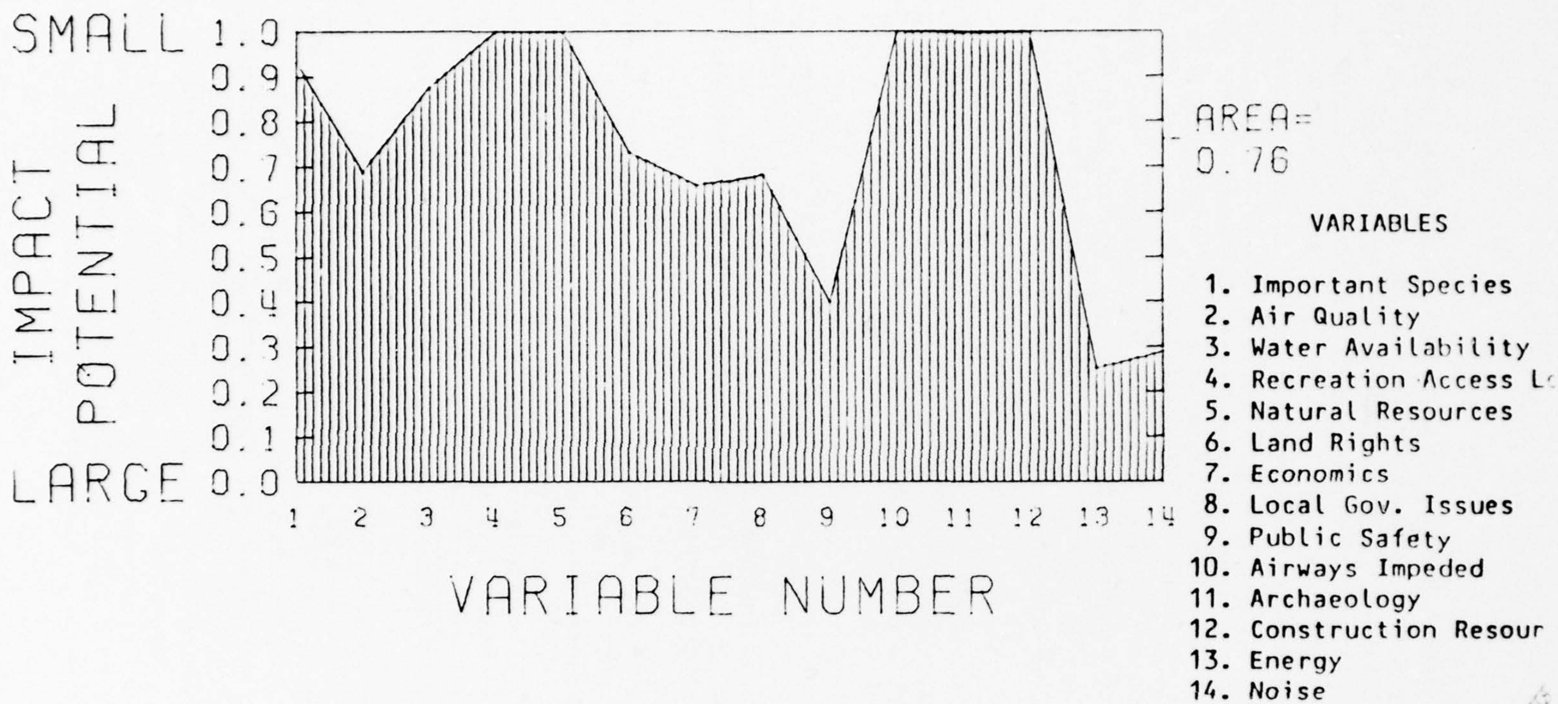


Figure 3.3-10. Air mobile parametric impact analysis WBJ typical — MOB summary.

A very low impact potential to natural resources is associated with this option. Construction of new alert bases involves the greatest, but still very low, impact potential of the project features. The impacts of this air mobile option, which involves a smaller total disturbed area distributed as small units (less than 2 mi^2) over a much larger region having generally greater levels of existing disturbance, appear very small. The low overall proportion of undisturbed natural biological habitat or areas of high biological sensitivity in the Central CONUS areas being considered reduces the impact potentials in this analysis. Particular actions, for example siting of new alert facilities in a natural area could have a high impact, however, the probability of this happening by chance is low. These potential effects are site-specific and would be dealt with in site-specific environmental studies that would be conducted if a decision were made to deploy the air mobile option.

Construction of seven new alert bases will require up to 13 mi^2 of land. This constitutes the principal source of impact potential for the land rights concern due to the potential for displacement of persons and the potential for loss of prime farmland.

Impact potentials associated with local economic issues (including the jobs for local residents created by the project and changes in public expenditures in both construction and operation, and possible loss of agricultural output) are moderate and are essentially confined to the main operating bases.

The impacts of this alternative on local government issues are estimated to be small to moderate. The labor requirements for the construction or modification of the alert bases are relatively small, ranging from 60 to 180 construction workers at any given base. Such a small demand for labor can be met in almost any location, as the labor market area is considered to be within a 60 mi commuting distance from the base location. With no importation of labor required, there would be no requirements for new housing or additional public expenditures.

Approximately 1,100 to 1,400 construction workers would be involved in modification of four MOBs. Some of the Air Force bases which may be used as MOBs are located in sparsely populated areas, and do not have sufficient construction labor force available within their respective labor market areas. This results in the in-migration of construction workers and their dependents from other parts of the country and the consequent demands for new housing and public expenditures. This is compounded in some cases by the in-migration of indirect workers and their dependents where the local labor market area is unable to fulfill the demand. The net result is a higher level of impact potential indicated by a low rating on the impact potential scale.

The number of operations employees will range from 3,400 and 3,800. Housing requirements for these employees will be substantial. In addition, the in-migration of some indirect workers in the vicinity of those MOBs which are located in sparsely populated areas, increases the demands on housing and public expenditures. This results in a larger impact potential indicated by a low value on the impact potential scale.

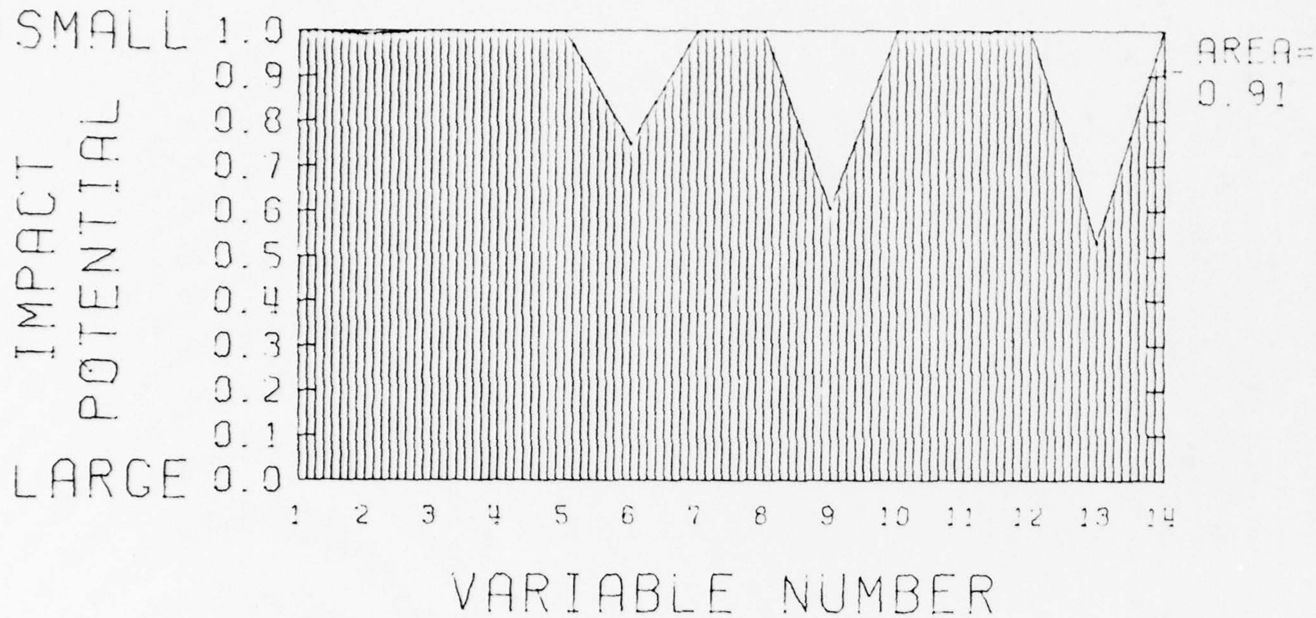
Public safety concerns show moderately large impact potential for MOBs, new alert bases, and co-use of civilian airfields due to high public visibility (Figure 3.3-11). Perceived hazard potential will be at co-use military facilities (Figure 3.3-12). Thorough analysis of safety design will be carried out as a continuing part of FSED. Strict adherence to the nuclear safety design criteria and explosive safety standards will ensure elimination and control of actual hazards to the public.

The impact potential of this configuration on energy is large. Construction and operations phase electricity demands relative to supply are primarily responsible for this impact potential; petroleum, oil, and lubricants (POL) for operations, had impact potential ratings of 0.44, 0.10, and 0.99, respectively.

The impact potential for archaeological impacts for this configuration is very low. This is due to the fact that a total of about 16 mi^2 (for main operating base and alert base modifications) would be disturbed over a very large area. With land disturbances of this extent, there is a high probability that some archaeological sites would be encountered. However, most or all of these impacts could be reduced through project modifications and implementation of a data recovery program.

Construction resource impacts are estimated to be negligible since resource requirements, principally cement and asphalt, are estimated to comprise a relatively small share of available regional supply.

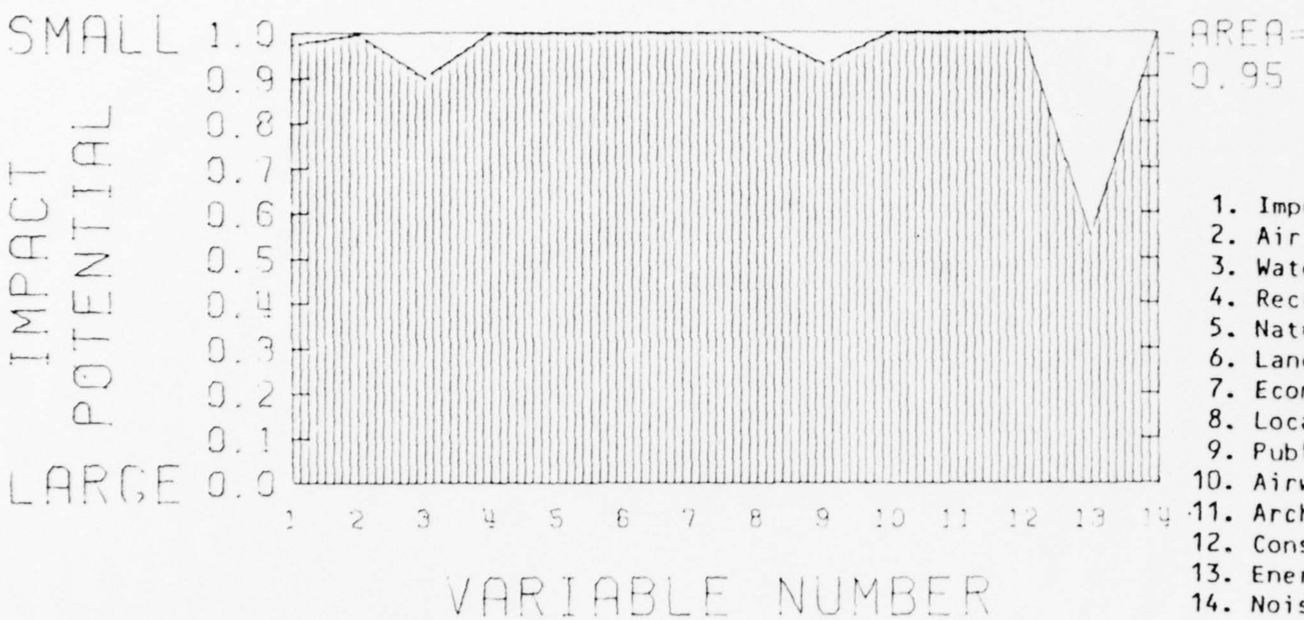
Electricity demand for construction was estimated in terms of total construction costs and induced population in-migration. Construction electricity demands are estimated to be as much as 105 MW at MOBs and could be as high as 5.5 MW per alert base. When compared to 1986 regional electricity reserves, estimated by the National Electric Reliability Council, construction phase electricity demands are large, raising the overall impact potential of the energy issue. Operations phase electricity demand may result in impacts which are moderately acceptable. This is due primarily to the limited number (4) of MOBs required. Potential impacts of this configuration on POL can be expected to vary with MOB location. The relatively low impact potential is due primarily to the availability of POL to military users.



VARIABLES

1. Important Species
2. Air Quality
3. Water Availability
4. Recreation Access Los
5. Natural Resources
6. Land Rights
7. Economics
8. Local Gov. Issues
9. Public Safety
10. Airways Impeded
11. Archaeology
12. Construction Resourc
13. Energy
14. Noise

Figure 3.3-11. Air mobile parametric impact analysis WBJ typical — Co-Civ alert.



VARIABLES

1. Important Species
2. Air Quality
3. Water Availability
4. Recreation Access Loss
5. Natural Resources
6. Land Rights
7. Economics
8. Local Gov. Issues
9. Public Safety
10. Airways Impeded
11. Archaeology
12. Construction Resources
13. Energy
14. Noise

Figure 3.3-12. Air mobile parametric impact analysis
WBJ typical — Co-Mil alert.

A moderate noise impact potential is indicated by the analysis. Little impact is seen for operations around the alert bases, greater impacts are expected from the large number of flights at the MOBs. New alert bases tend to show higher impact potential because the transient aircraft noise is more intrusive to the surrounding communities.

AMST Reduced Cost (3.3.3)

The elements of the AMST reduced cost configuration are summarized in Table 3.3-3. Cost reduction is obtained by employing two missiles per aircraft and 240 missiles to result in 120 operational and 210 total AMST aircraft. Two MOBs are used to support missile aircraft and three more for the aircraft results in 24 operational aircraft supported by each MOB. Thirty-five alert bases are employed and seven alert bases are served by each MOB. In contrast to the "typical" alternatives, all alert bases are existing and will be either co-use civilian or co-use military with the preponderance being co-use military.

The summary profile of impact potential developed in the parametric impact analysis for the AMST reduced cost configuration is given in Figure 3.3-13. The impact potential at the MOBs is summarized in Figure 3.3-14.

A moderately large impact potential exists for energy use, noise, and public safety issues result from the deployment of this configuration. Energy impacts result largely from the redistribution of energy demand within the North Central CONUS region. The impacts are moderately large for the type of installation analyzed with the largest effect at the MOBs. Noise-related impacts stem from the large number of flights in and out of the MOBs, especially at those which are located in large urban areas. Public safety issues have moderately large impacts at the co-use civilian airfields (Figure 3.3-15) due primarily to the system's visibility to the public.

A moderate impact potential exists for the economic and local government issues and to some extent for the land rights issue. Economic impacts, though generally beneficial to the local job seekers are tempered by the possible inflationary effect where the project demand exceeds the local labor supply. This is particularly true for the MOBs which may be located in sparsely populated areas. The local government issues are similarly governed by the level of in-migration of construction and/or operations phase workers and their dependents at any given base, since in-migration results in increased demands for housing and additional public expenditure required to provide the necessary infrastructure for the additional population. The land rights issue shows moderate impacts mainly due to the possibility of relocation of inhabitants from lands which may be acquired for the construction, expansion or modification of new or existing bases (Figure 3.3-16).

Although such relocation efforts may involve only a small number of people, it could result in sociopolitical controversy to the detriment of the project. Two other variables of private land required and the possible loss of prime agricultural lands also contribute to this relatively higher impact.

Table 3.3-3. Elements of the AMST reduced cost configuration.[1]

CONFIGURATION ELEMENT		REDUCED COST	ELEMENT SUMMARY
Missiles	Total	240	240
Aircraft	Alert Aircraft	120	210
	Reserve Aircraft	90	
MOBs	Missile & ACFT Support	2	5
	Aircraft Support Only	3	
	Alert Function Only	0	
Co-Use Military Alert Bases	4 ACFT/0 New Runway	10	28
	4 ACFT/1 New Runway	5	
	4 ACFT/2 New Runway	5	
	2 ACFT/0 New Runway	8	
New Alert Bases	4 ACFT/1 Runway	0	0
	4 ACFT/2 Runways	0	
Co-Use Civilian Alert Bases	4 ACFT/0 New Runway	5	7
	2 ACFT/0 New Runway	2	
Alert Base Total (Co-Military + New + Co-Civilian)			35

[1]Representative range of system parameters.
(Subject to refinement in FSED).

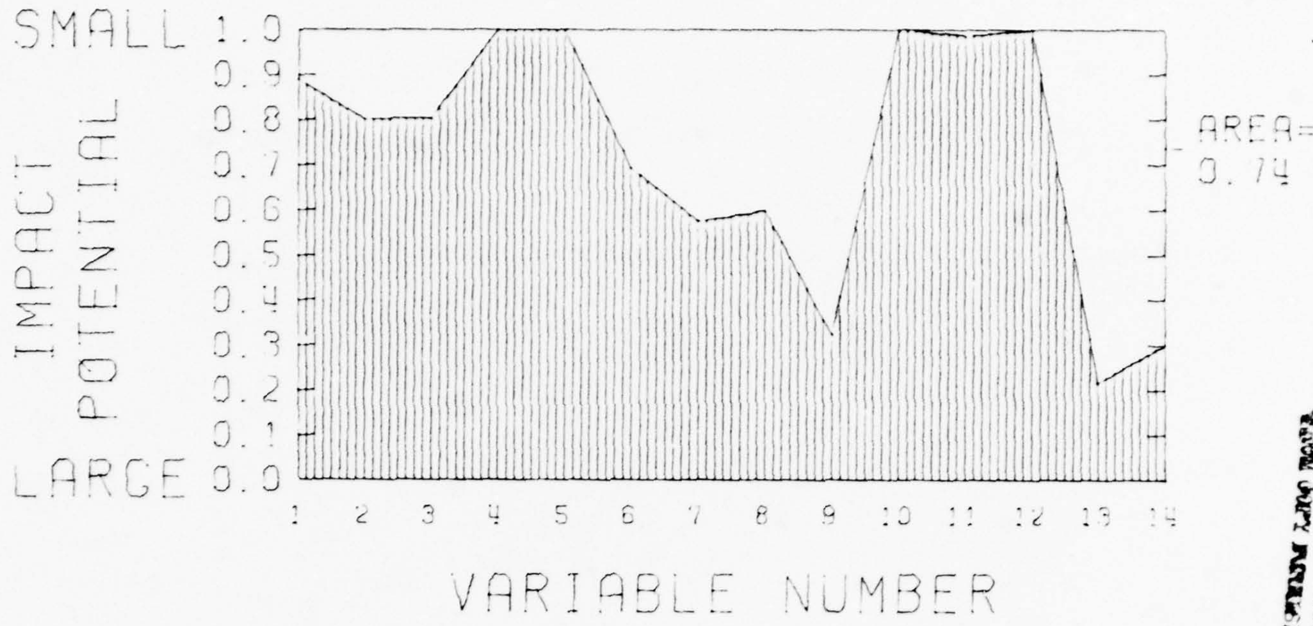


Figure 3.3-13. Air mobile parametric impact analysis
AMST reduced – project summary

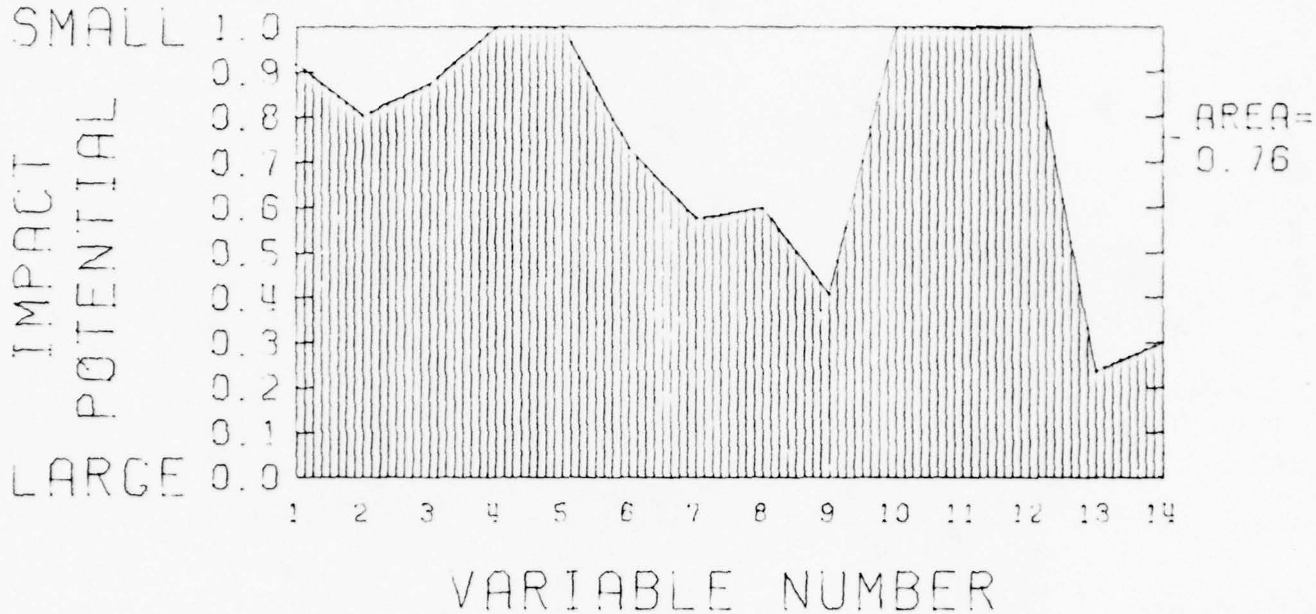


Figure 3.3-14. Air mobile parametric impact analysis
AMST reduced — MOB summary

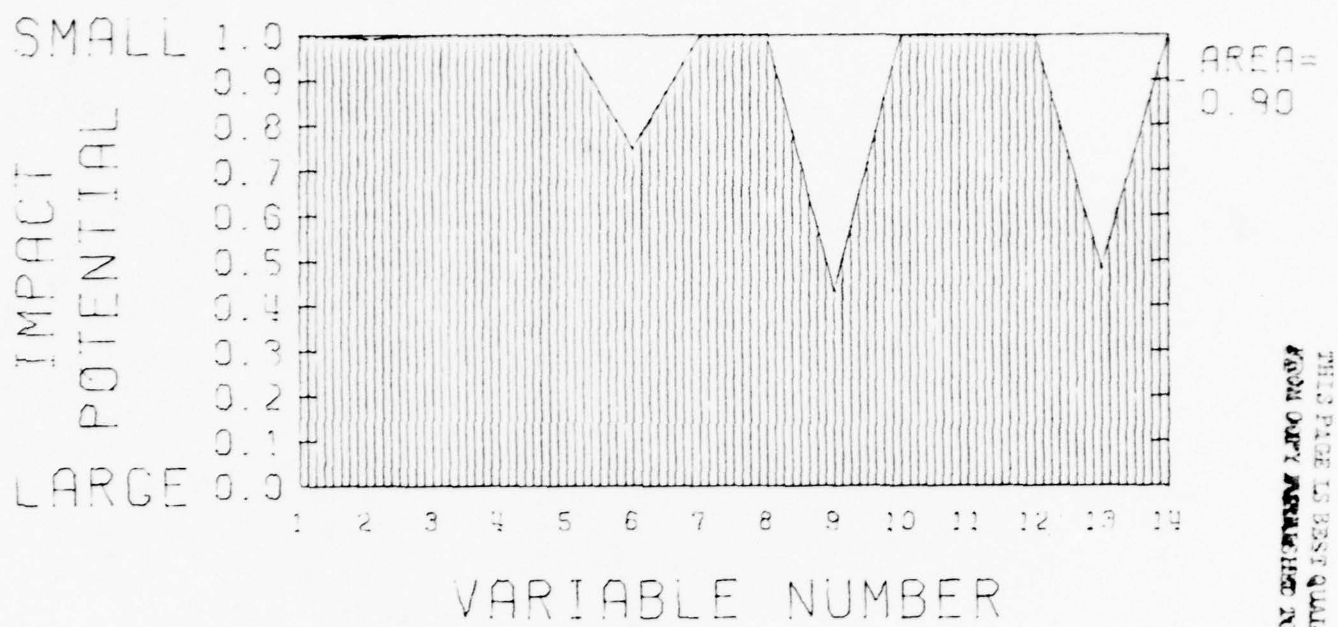


Figure 3.3-15. Air mobile parametric impact analysis
AMST reduced — CO-CIV alert

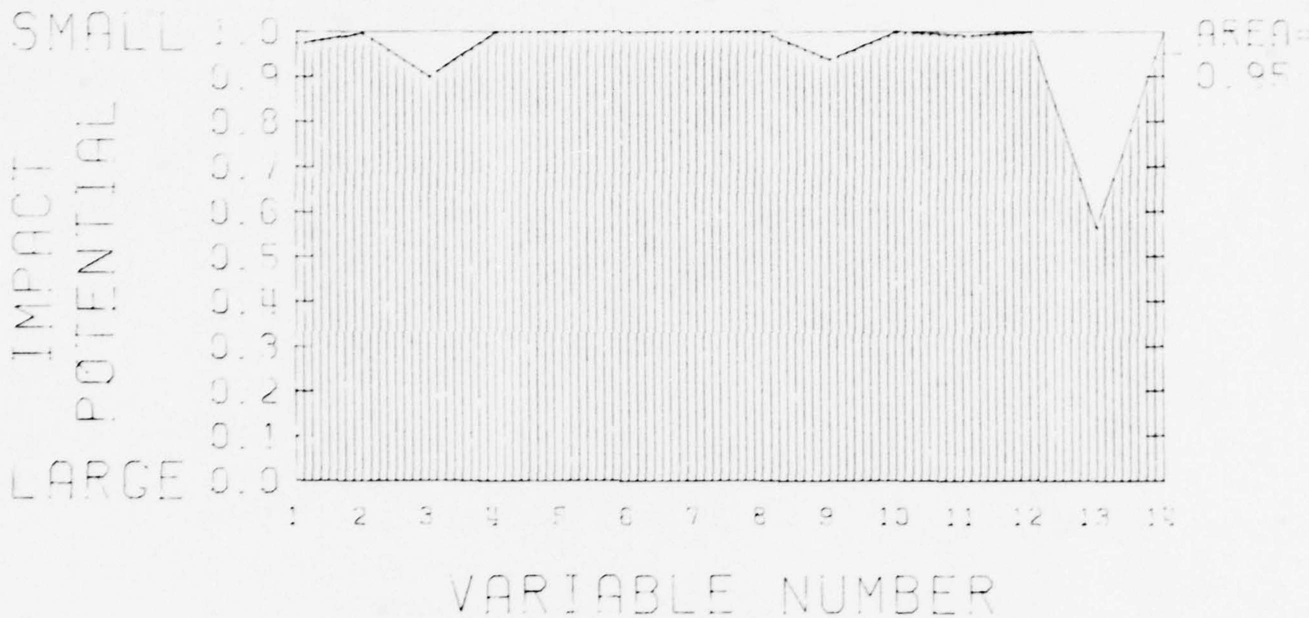


Figure 3.3-16. Air mobile parametric impact analysis
AMST reduced — CO-MIL alert

Impacts related to the interference with important species, air quality, water availability, recreation access loss, loss of natural resources, archaeology and construction resources are estimated to be small. Moreover, many of these issues are site-specific and can be avoided by a careful site selection process (Figure 3.3-17).

WBJ Reduced Cost (3.3.4)

The elements of the WBJ Reduced Cost configuration are summarized in Table 3.3-4. Cost reduction for this WBJ option is achieved by eliminating the requirement for new alert bases and reducing the total number of these bases. Numbers of aircraft and MOBs are the same as the WBJ Typical configuration. The number of alert bases has been reduced from 30 to 25 resulting in six alert bases per MOB and about three aircraft per alert base. Twenty of the alert bases are converted from existing military facilities while five involve modifications to civilian facilities.

The profiles of impact potential developed in the parametric impact analysis of the WBJ Reduced Cost configurations are shown in Figure 3.3-18. The impact potential summary for alert bases is given in Figure 3.3-19.

Moderately large impact potentials exist for public safety, energy, and noise. Air quality, land rights, and local government issues have moderate impact potentials. Low to minimal impact potentials exist for the remaining concerns.

A minimum impact potential to natural resources is associated with this configuration which requires construction of no new alert bases. Expansion of facilities and operations at existing military and civilian installations to serve as MOBs and alert bases has a minimal potential for impact to natural resources (Figure 3.3-20). Depending upon the installation chosen, the placement of new facilities, the degree of operations expansion, and (for MOBs) the degree of effects from induced population growth, a potential for impacts does exist. These effects are site-specific, however, and would be considered in site-specific environmental analyses that would be conducted if this option is deployed.

In terms of the local economic issues that are of concern, the impacts of this configuration, the low cost WBJ option, are estimated to be moderate. Local economic issues include the jobs for local residents caused by the project in both the construction and operations phases and are significant only at the MOBs, particularly where a relatively small unemployed labor pool exists. Potential for agricultural loss is very small.

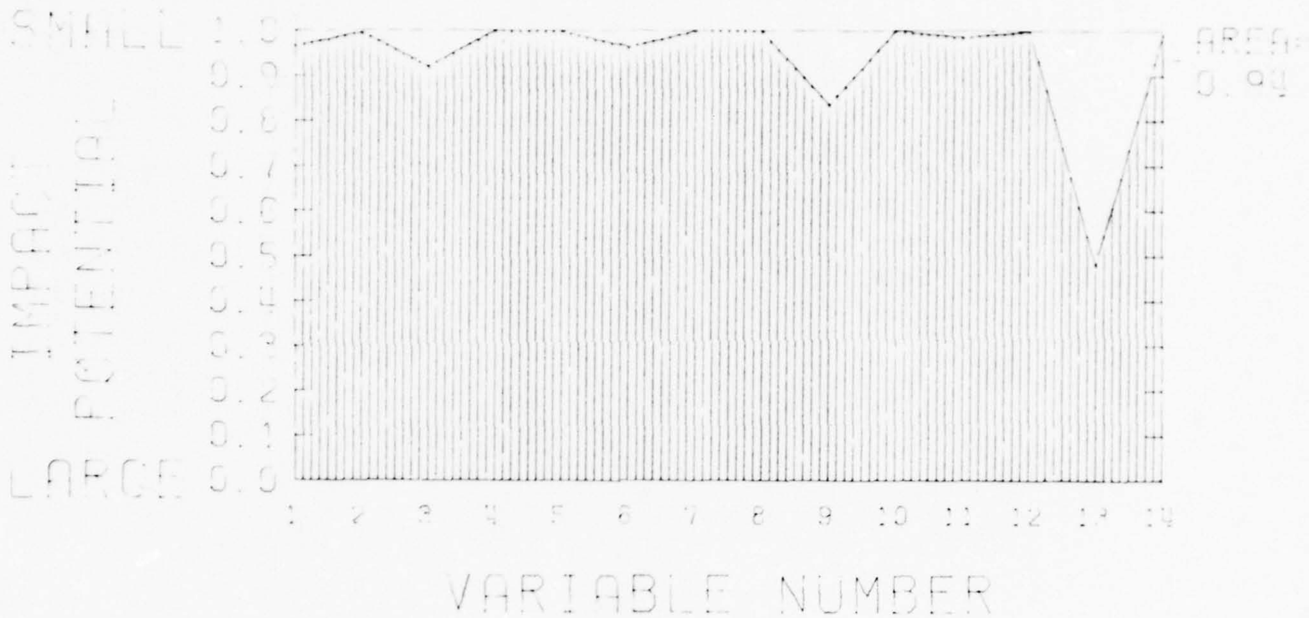


Figure 3.3-17. Air mobile parametric impact analysis
AMST reduced — alert summary

Table 3.3.-4. Elements of the WBJ reduced cost configuration.[1]

CONFIGURATION ELEMENT		WBJ REDUCED COST	ELEMENT SUMMARY
Missiles	Total	200	200
Aircraft	Alert Aircraft	100	175
	Reserve Aircraft	75	
MOBs	Missile and ACFT Support	2	4
	Aircraft Support Only	2	
	Alert Function Only	0	
Co-Use Military Alert Bases	4 ACFT/0 New Runway	10	20
	4 ACFT/1 New Runway	5	
	4 ACFT/2 New Runway	5	
	2 ACFT/0 New Runway	0	
New Alert Bases	4 ACFT/1 Runway	0	0
	4 ACFT/2 Runways	0	
Co-Use Civilian Alert Base	4 ACFT/0 New Runway	5	5
	2 ACFT/0 New Runway	0	
Alert Base Total (Co-Military + New + Co-Civilian)			25

[1]Representative range of system parameters.
(Subject to refinement in FSED).

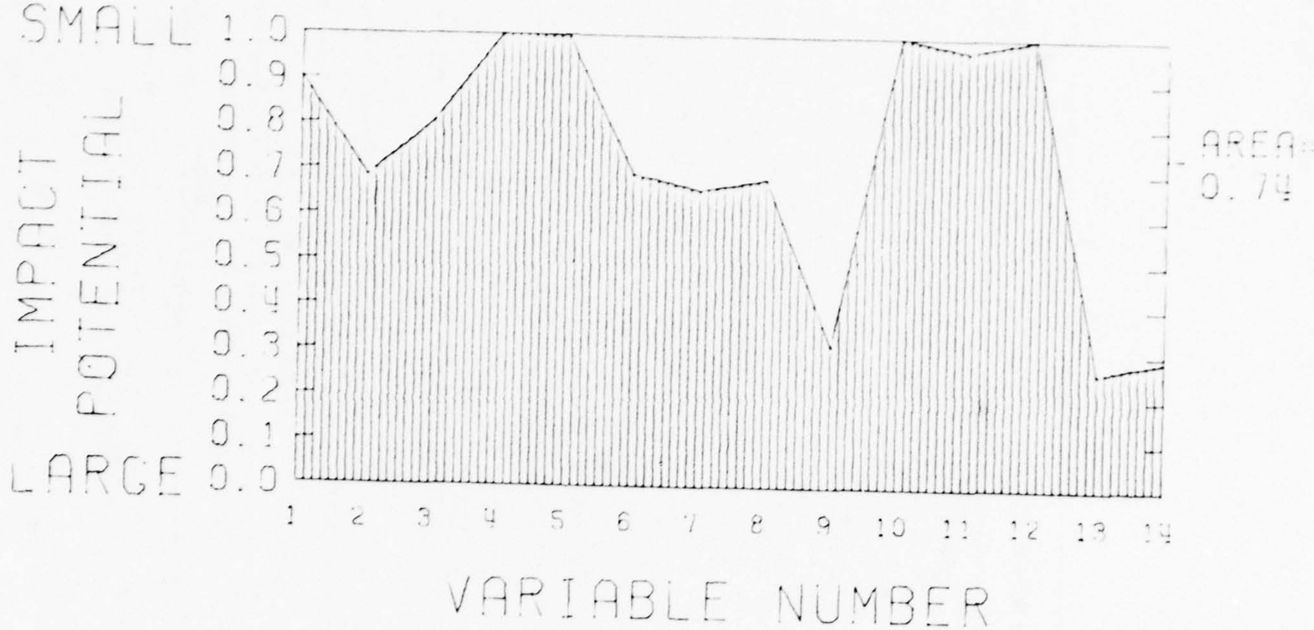


Figure 3.3-18. Air mobile parametric impact analysis WBJ reduced — project summary

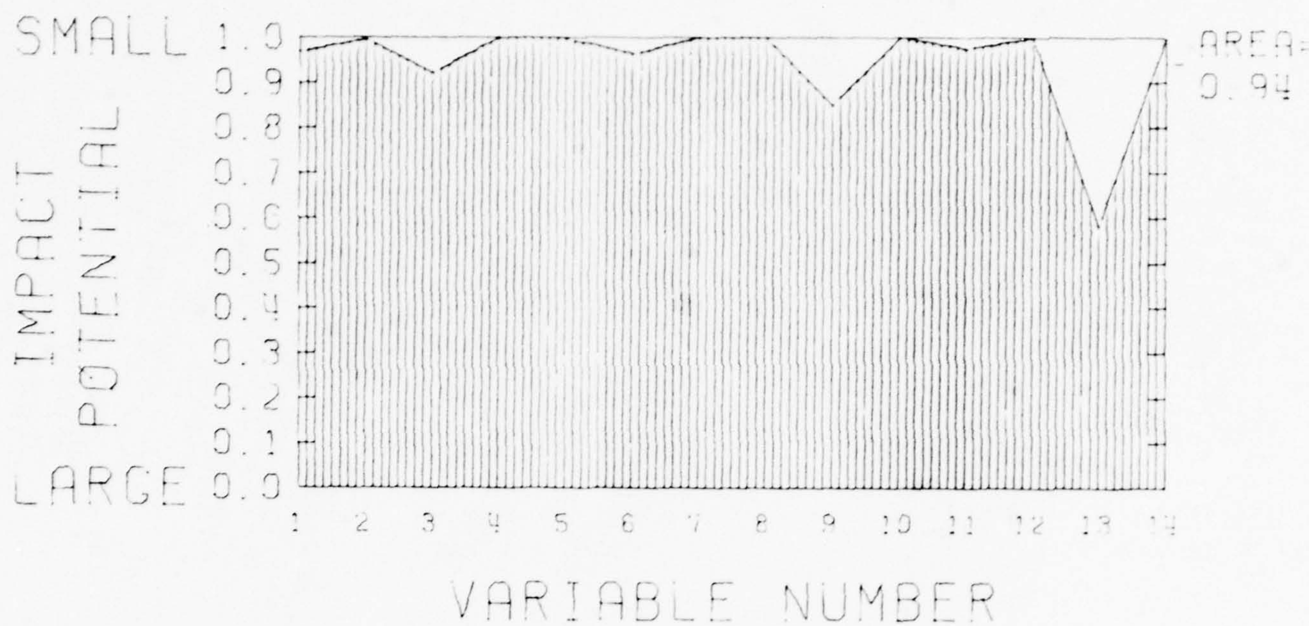


Figure 3.3-19. Air mobile parametric impact analysis WBJ reduced - alert summary

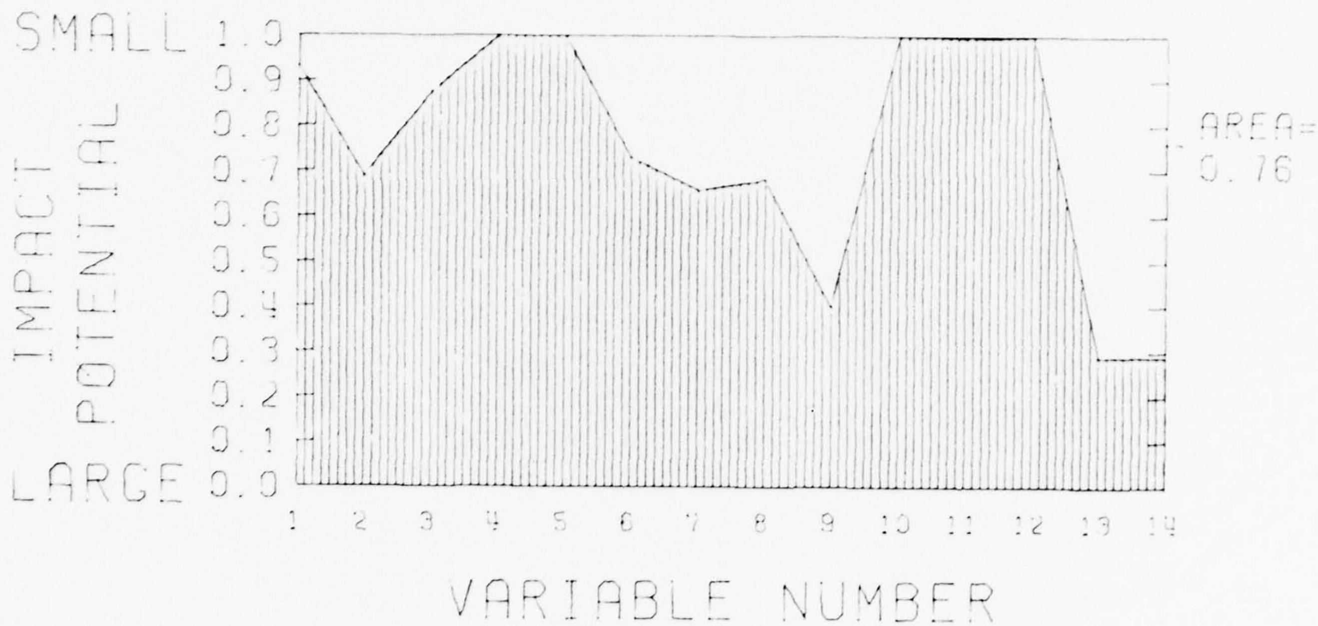


Figure 3.3-20. Air mobile parametric impact analysis
WBJ reduced — MOB summary

A moderate potential exists for impacts associated with local government issues due primarily to importation of personnel required for construction and for operations at MOBs. At MOBs, modifications to the existing facilities will be required involving abo· 1,100 to 1,400 construction workers. For MOBs located in sparsely populated areas, insufficient construction labor force would be available within their respective labor market areas. This results in the in-migration of construction workers and their dependents from other parts of the country and the consequent demands for new housing and public expenditures. This is compounded in some cases by the in-migration of indirect workers and their dependents where the local labor market area is unable to fulfill the demand. This can result in a significant potential for impacts. Alert base modifications would require a small work force (90 - 180) and can be met in almost any area without importation of workers.

The operations phase of the project requires the importation of workers for all the MOBs. Most of these workers would be federal military and civilian employees. Some of them would live on base, but others would require accommodations in the communities adjacent to the base. Since the number of such workers ranges from 3,400 and 3,800, their housing requirements are substantial. In addition, the in-migration of some indirect workers to the vicinity of those MOBs located in sparsely populated areas increases the demands on housing and public expenditures. In sparsely populated areas this also would result in significant impacts.

Public safety issues show a moderately large impact potential for the reduced cost WBJ configuration. The largest impact potentials exist for the MOBs and co-use civilian alert bases (Figure 3.3-21).

The potential hazards associated with the operation of an MOB and co-use civilian airfield are the storage and handling of aircraft, missiles, fuel, and propellants. The areas affected, and the distribution of population within those areas are major determinants of the impact potential. Continuing assessment of safety design and the elimination and control of hazards will be addressed as part of FSED.

This configuration is estimated to have a moderately large impact potential on energy resources. Of the three components of the energy issue, construction phase electricity demand, operations phase electricity, and POL demand make the largest contributions to this impact potential. Operations phase demands for electricity are considered less significant than the construction phase, yet still represent a large demand. Aircraft fuel required during operations is substantial but represents a small proportion of national aircraft fuel consumption.

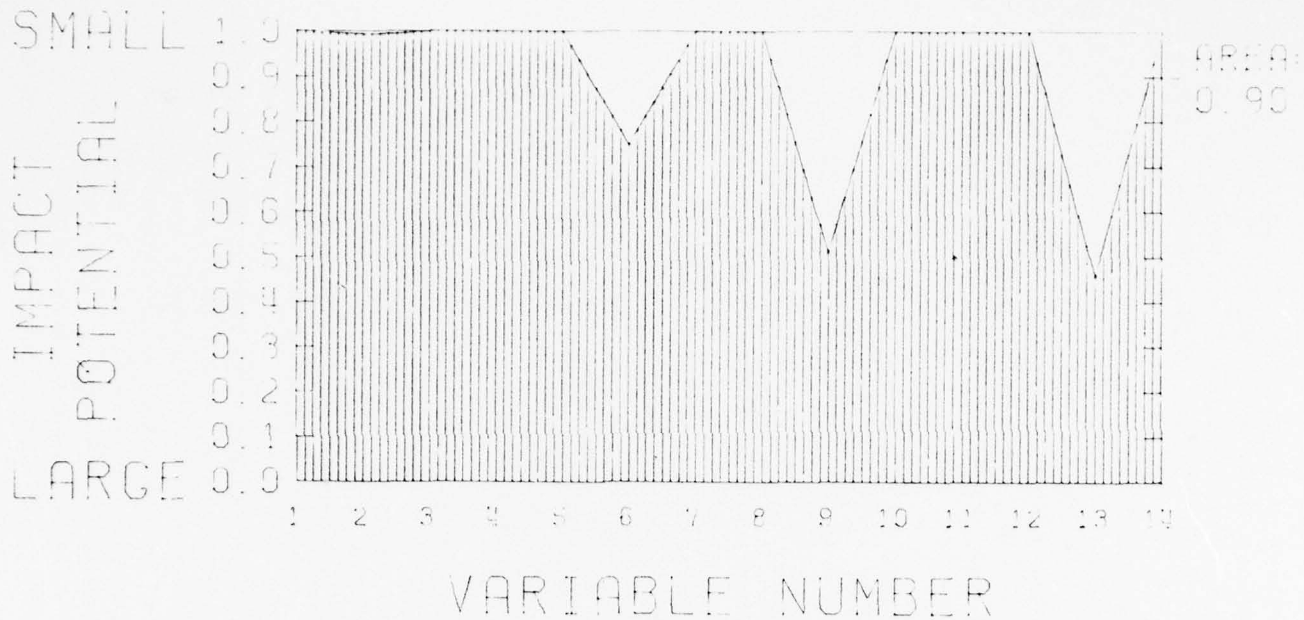


Figure 3.3-21. Air mobile parametric impact analysis WBJ reduced — Co-Civ Alert

Construction phase electricity demand will be high, primarily as a result of project construction and personnel requirements and extensive indirect population in-migration. The construction phase demand for electricity may be as much as 105 MW for the four MOBs required. Operations phase demands for electricity will decrease as in-migration stabilizes after construction, yet still maintains a moderately large impact potential when compared to regional electricity reserves estimated for 1986 by the National Electric Reliability Council. POL requirements, though substantial, will not result in significant constraints because of ready availability of POL to military users.

This option has a moderately large noise impact potential with the increased air operations at main operating bases being the chief sources of impact. At MOBs, the number of flights could cause additional complaints around the existing airfields although co-use alert bases are not expected to substantially increase noise (Figure 3.3-22). Usually, the population around the MOBs is relatively high. As the noise contours are altered (or expanded), it is likely that the number of people exposed to higher levels of noise progressively increases.

WBJ MOB/Alert (3.3.5)

The elements of the WBJ MOB/Alert configuration are summarized in Table 3.3-5. This alternative eliminates all smaller alert bases, positions alert aircraft on the MOB, and adds several major airbases to satisfy the alert function. The purpose of this configuration is to gain insight into the environmental effect of the many alert bases by eliminating them from consideration. It is recognized that the configuration is not equivalent to the other in a performance sense. Two missiles per aircraft and a total of 200 missiles result in 100 operational and 175 total WBJ aircraft, the same as other WBJ configurations. Two MOBs will support missiles and aircraft, two for aircraft only, and six will serve as alert bases only. This results in ten alert aircraft per MOB/alert base.

The profiles of impact potential developed in the parametric impact analysis of the WBJ MOB/Alert configuration is given in Figure 3.3-23. This figure summarizes the overall impact potential of the WBJ MOB/Alert configuration. The next two figures address impact potential at all the MOB and at those MOBs which serve an alert function only.

For this configuration, only public safety, energy, and noise indicate moderately large impacts. Operations at MOBs will include storage and handling of aircraft, missiles, propellants, and aircraft fuel. The potential hazards associated with these activities will be eliminated or controlled through design; however, the visibility of the

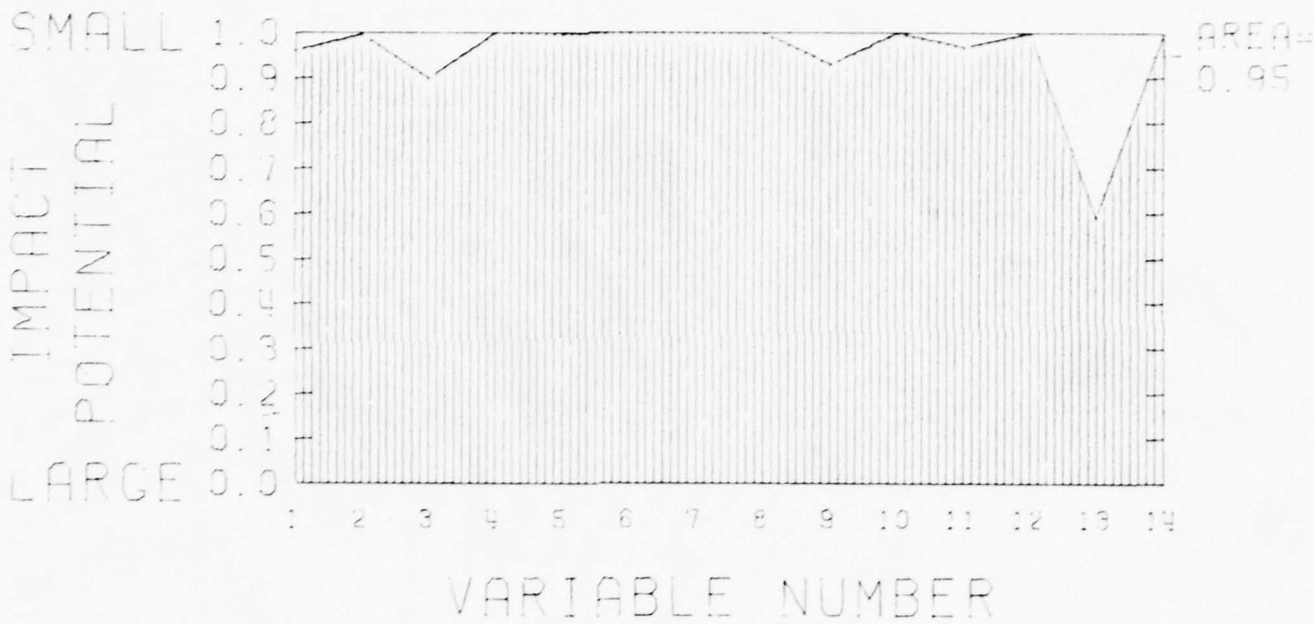


Figure 3.3-22. Air mobile parametric impact analysis
WBJ reduced — Co-Mil Alert

Table 3.3-5. Elements of the WBJ MOB/Alert configuration.[1]

CONFIGURATION ELEMENT		WBJ MOB/ALERT	ELEMENT SUMMARY
Missiles	Total	200	200
Aircraft	Alert Aircraft	100	175
	Reserve Aircraft	75	
MOBs	Missile and ACFT Support	2	10
	Aircraft Support Only	2	
	Alert Function Only	6	
Co-Use Military Alert Bases	4 ACFT/0 New Runway	0	0
	4 ACFT/1 New Runway	0	
	4 ACFT/2 New Runway	0	
	2 ACFT/0 New Runway	0	
New Alert Bases	4 ACFT/1 Runway	0	0
	4 ACFT/2 Runways	0	
Co-Use Civilian Alert Bases	4 ACFT/0 New Runway	0	0
	2 ACFT/0 New Runway	0	
Alert Base Total (Co-Military + New + Co-Civilian)			0

[1]Representative range of system parameters.
(Subject to refinement in FSED).

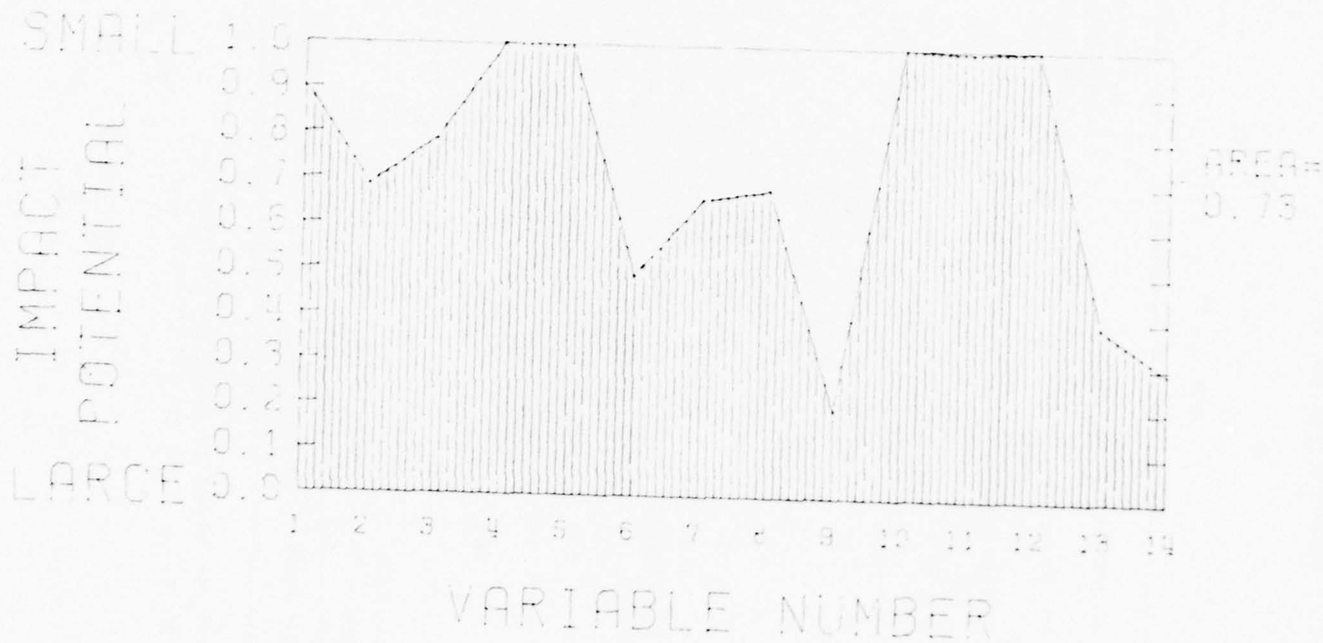


Figure 3.3-23. Air mobile parametric impact analysis
WBJ MOB alert - project summary

operations to area residents particularly at those MOBs which are located close to large urban centers results in large potential impact (Figure 3.3-24). Proximity of some MOBs to large urban centers is also the reason for relatively higher noise impacts. The third issue which shows moderately large impact is energy. This is primarily a function of construction phase electricity demand but petroleum, oil, and lubricants (POL) consumption of the project also adds to the severity of the impact. Electricity for the project is to be obtained from commercial sources, and the supply projections in some potential MOB locations indicate low reserve margins.

Of the three issues showing moderate impacts, the land rights issue is affected by the possible relocation of inhabitants from lands which might be acquired for the expansion and modification of bases utilized as MOBs (Figure 3.3-25). Although, such a relocation may be relatively small, it has the potential for sociopolitical controversy detrimental to the project. The other two issues which show moderate impacts are economic and local government issues. Both of these are related to the potential in-migration of relatively large numbers of workers and their dependents at MOBs which may be located in sparsely populated areas. In such locations, the beneficial effects of generating jobs for locally unemployed persons are tempered by the in-migration of persons from other areas. These in-migrants require new housing and additional public services thus straining the local government budgets and the small economies of such areas. Issues related to the interference with important species, air quality, water availability, loss of natural resources, archaeology and construction resources are not impacted to as great an extent because most of the project-related activities are concentrated at relatively fewer sites.

3.4 BRIEF COMPARISON OF AIR MOBILE CONFIGURATIONS

This air mobile environmental analysis has five configurations that vary the number and type of main operating and alert bases. The system is then placed in different deployment regions and the primary factors are varied to estimate the sensitivity to areal parameters and/or quantitative estimates are incorporated into this analysis.

Relative impact values of fifty environmental variables have been computed for each base type. These have been combined into values that represent the bases of each configuration and then these values have been combined to represent the force. The individual variables for each combination have been aggregated into the fourteen concerns as outlined in Section 3.1.

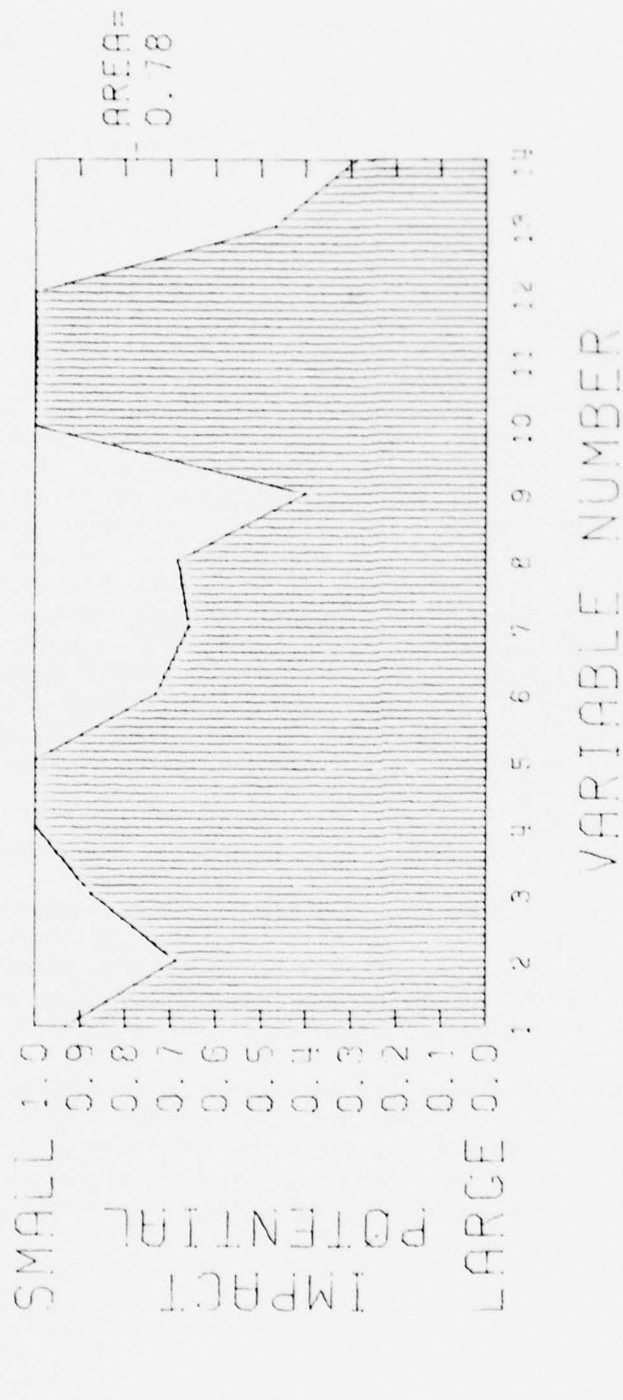


Figure 3.3-24. Air mobile parametric impact analysis
WBJ MOB alert - MOB summary

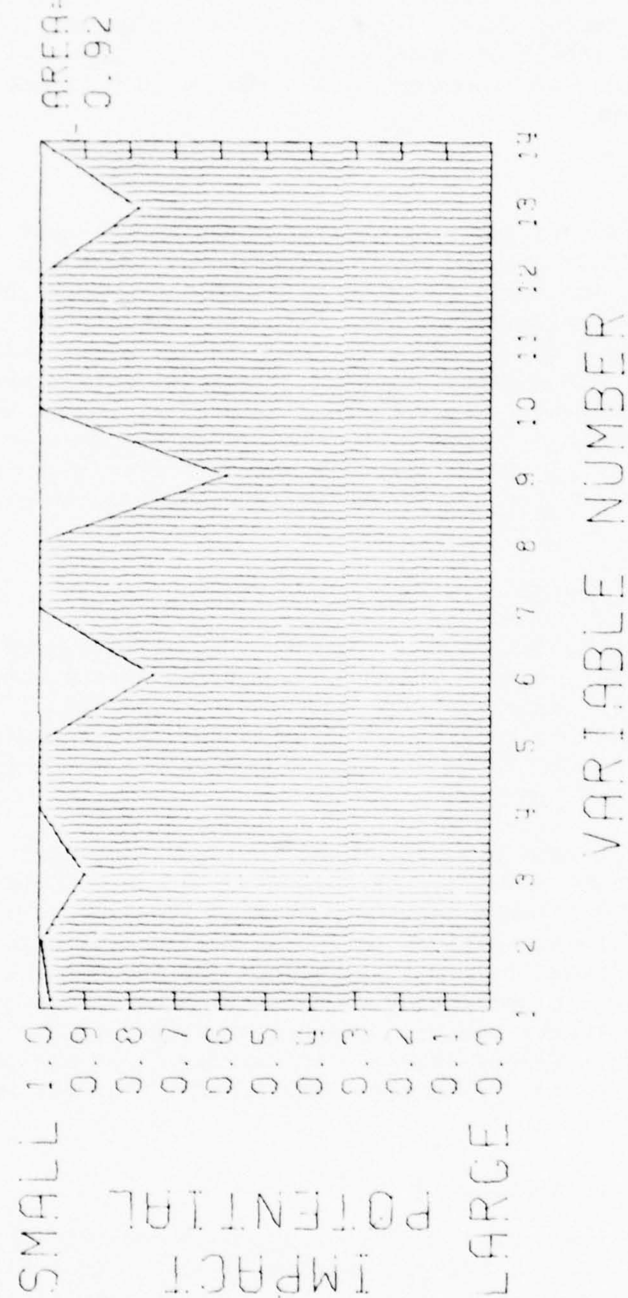


Figure 3.3-25. Air mobile parametric impact analysis
WBJ MOB alert — Co-Mil Alert

The radius of influence effect has been evaluated by analyzing three siting areas that represent the entire Central CONUS, the North Central CONUS, and a restricted area of the North Central CONUS. Specific primary engineering factor values were increased and decreased by 20 percent to estimate the effect of changing the range of the variables. In each case, the results were compared with baseline results obtained through impact analysis.

Areal Effects (3.4.1)

Reduction in the area from the Central CONUS to the restricted area in the North Central CONUS would place constraints upon siting criteria and may require more new bases to be constructed. A comparison of the alert base summary for wide-bodied jets is presented in Figure 3.4-1 where spacing reduction has forced a revision in the base configuration. The economics, local government issues, and regional energy variables are of particular interest. These three show greater impact potentials in the constrained North Central CONUS than are anticipated in the Central CONUS. The Central CONUS overall profile has a greater area and corresponding greater siting flexibility and is superior from an environmental prospective.

Radius of Influence Effects (3.4.2)

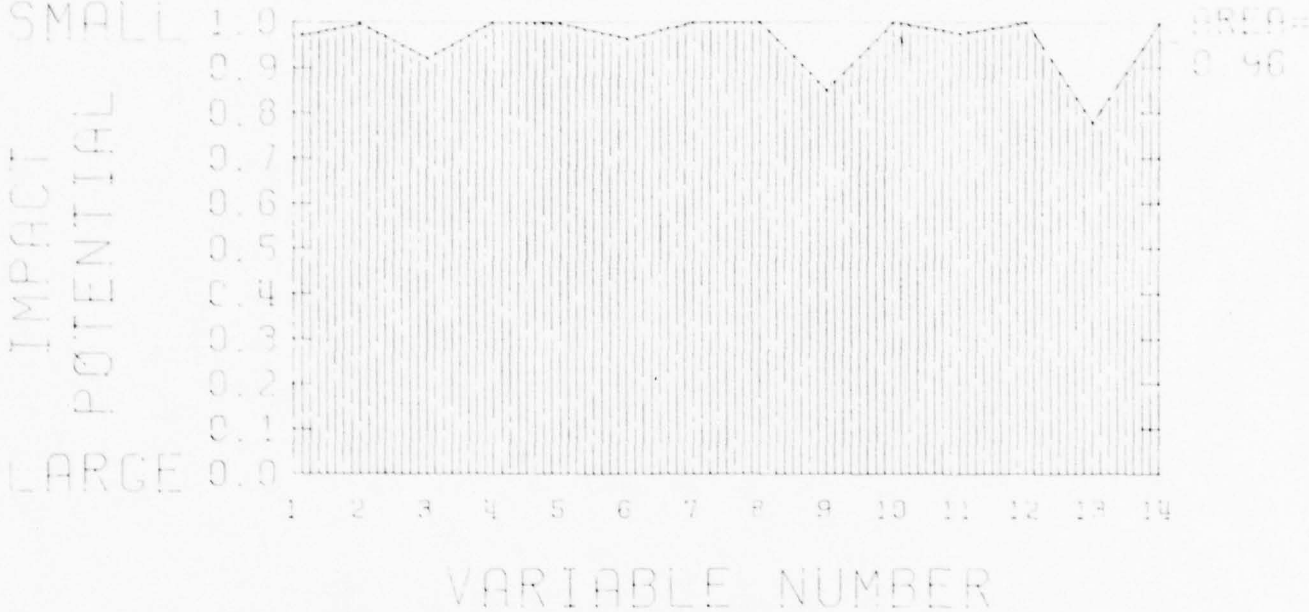
Environmental variables have different radii of influence. When the bases are far apart, many environmental effects do not interact and the total impact is the impact of the individual components. As the bases draw closer together, environmental effects begin to reinforce each other and the impact of the entire system becomes greater than the impact of the individual parts.

Comparison of the AMST nominal project co-civilian alert base for the entire Central CONUS and the constrained North Central CONUS demonstrates the radii of influence impacts resulting from increased overlap. In Figure 3.4-2 results are noticeable in the socioeconomic variables where the increased demand for regional resources, including labor, demonstrates a greater impact potential for economies. In addition, the more intensely situated are the bases, the greater is the impact potential for local government issues. Concentration of the project increases the overall impact potential and results in an environmentally less acceptable project.

Sensitivity to Engineering Factors (3.4.3)

Appreciation of the validity of the estimated impacts can be found by varying values of the primary engineering factors (Table 3.1-3). These factors were increased and reduced by 20 percent to establish a

SITING IN THE ENTIRE CENTRAL CONUS ABOVE PERMITS GREATER FLEXIBILITY AND BASING WITHOUT CONSTRUCTION OF NEW BASES.



SITING IN THE CONSTRAINED NORTH CENTRAL CONUS BELOW INCREASES THE IMPACT POTENTIAL IN ECONOMICS, LOCAL GOVERNMENT ISSUES, AND REGIONAL ENERGY CONSUMPTION DUE TO LESS FLEXIBILITY IN BASING OPTIONS AND POTENTIAL INCREASED REQUIREMENTS FOR NEW ALERT BASES.

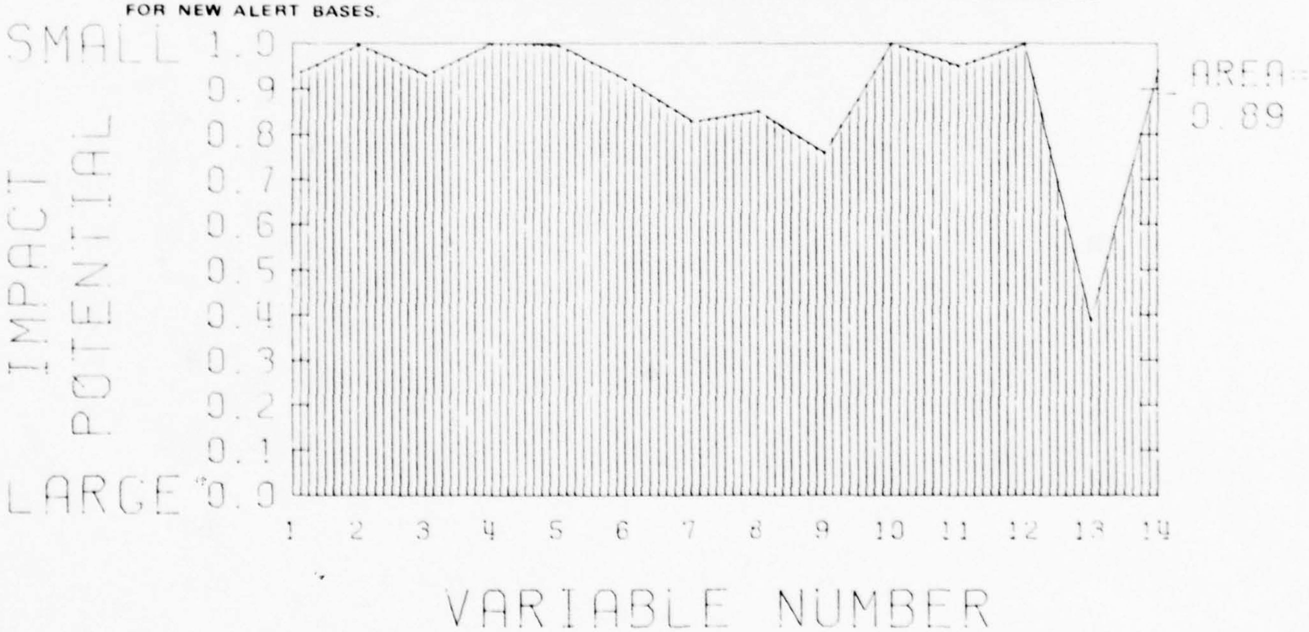


Figure 3.4-1. Comparison of air mobile impact potential for WBJ alert bases at alternative spacings.

SITING IN THE ENTIRE CENTRAL CONUS ABOVE PERMITS RESOURCE DEMAND FROM THE ENTIRE AREA AND MINIMIZES IMPACT POTENTIAL FOR ECONOMICS AND LOCAL GOVERNMENT ISSUES AS COMPARED TO SITING IN THE CONSTRAINED NORTH CENTRAL CONUS BELOW.

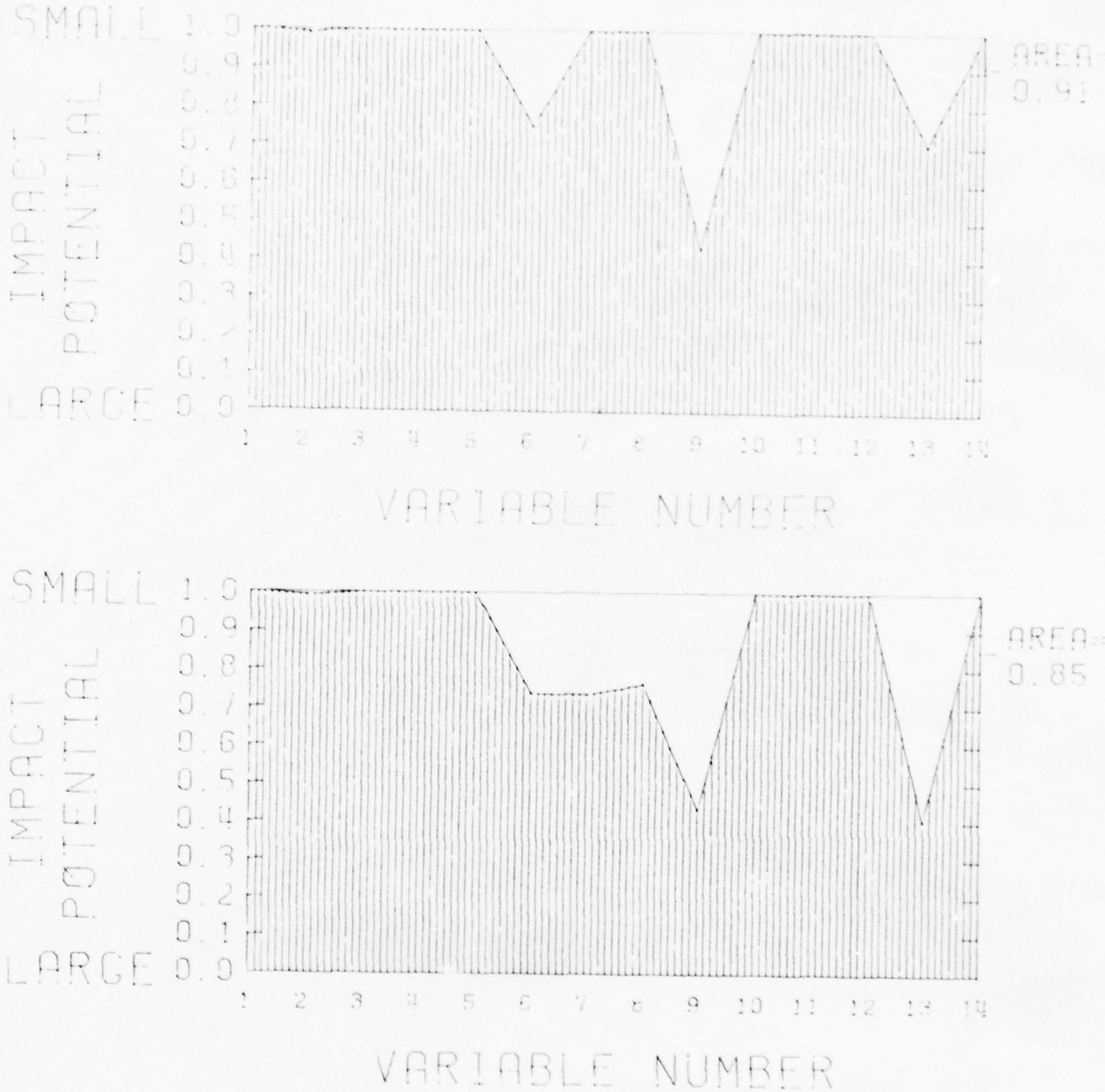


Figure 3.4-2. Comparison of air mobile impact potential for AMST co-civilian alert bases at alternative spacings.

range of estimations. Figure 3.4-3 presents the impact profiles for the AMST nominal case configuration within the Central CONUS and the results of varying the primary engineering factors which influence noise, air quality and local government issues.

Noise relates to the number of aircraft flights and local government issues and air quality relate to changes in personnel strength. The air quality is relatively insensitive to such changes as is local government issues, but as the figure shows, noise reflects a greater sensitivity to variations in the estimated values.

Summary of Air Mobile Configuration Comparison (3.4.4)

The environmental impacts associated with Air Mobile configurations as reflected in the profiles discussed above yield several conclusions. These are:

- An increased siting area permits flexibility which will have noticeably less environmental impact potential. This would encourage siting over as broad an area as possible within defensive limits.

- Variables of concern from both environmental as well as economic (cost) perspectives have a lessened potential impact wherever the resource requirements can be distributed over a broader area.

- The results contained in this environmental analysis are relatively insensitive to some estimate variations, particularly in the areas of cost and manning. Thus, configurations somewhat beyond the specific ranges of those addressed in this supplement would still be expected to have similar impacts.

3.5 COMPARISON WITH THE MULTIPLE PROTECTIVE SHELTER (MPS) OPTION

This section compares air mobile with the MPS as presented in the MX: Milestone II FEIS. A brief overview of the MPS system is presented followed by impact profiles for various excursions. Comparable air mobile configurations are then presented and the resulting potential impacts are discussed.

Brief Overview of the MPS Basing Modes (3.5.1)

The MPS system is a series of protective structures among which missiles are covertly transported. Security of the MPS system would be either point or area. Point security could have fencing and restricted

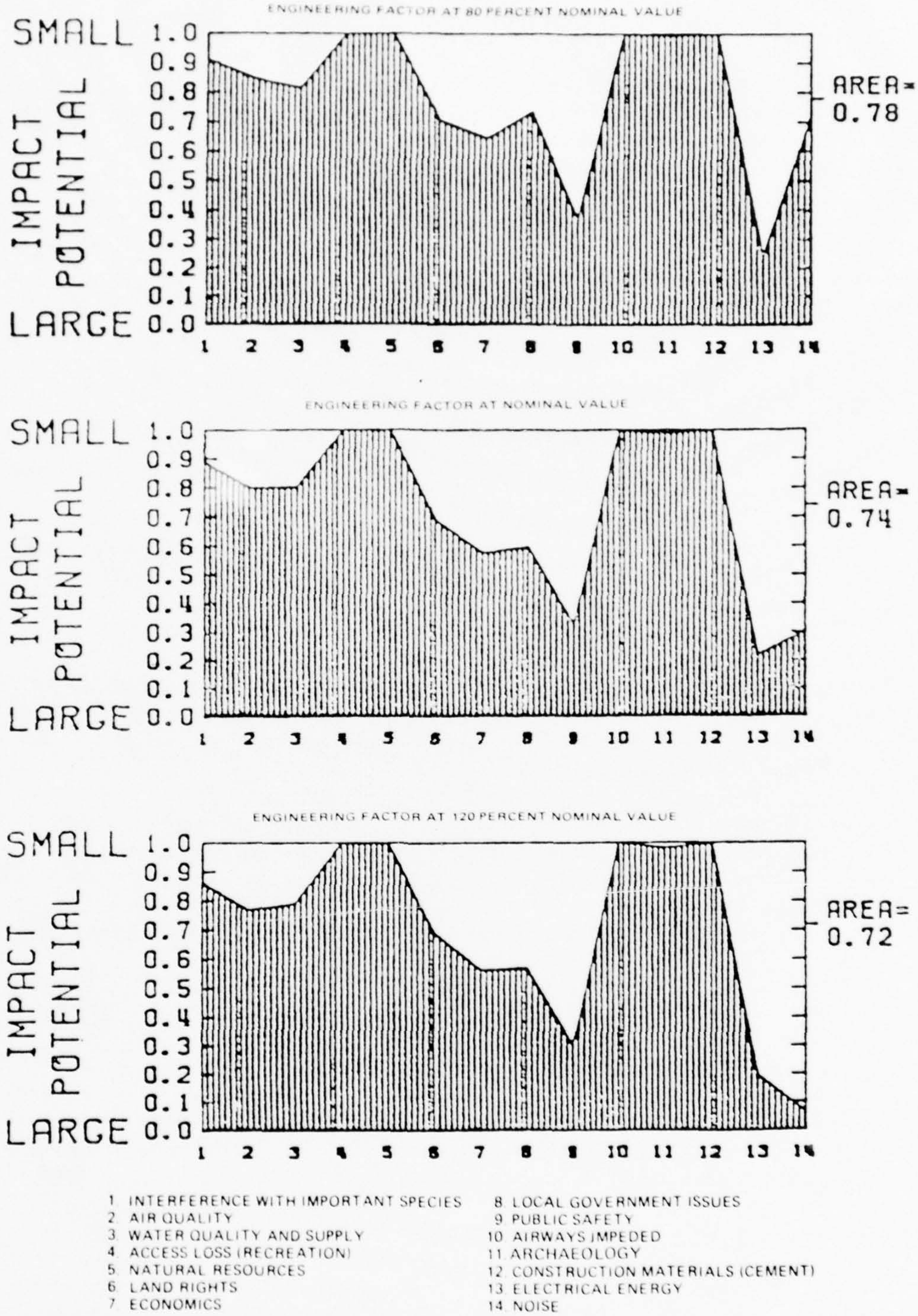


Figure 3.4-3. Effect on impact profiles of changing engineering factors by 20 percent down and up AMST reduced force project.

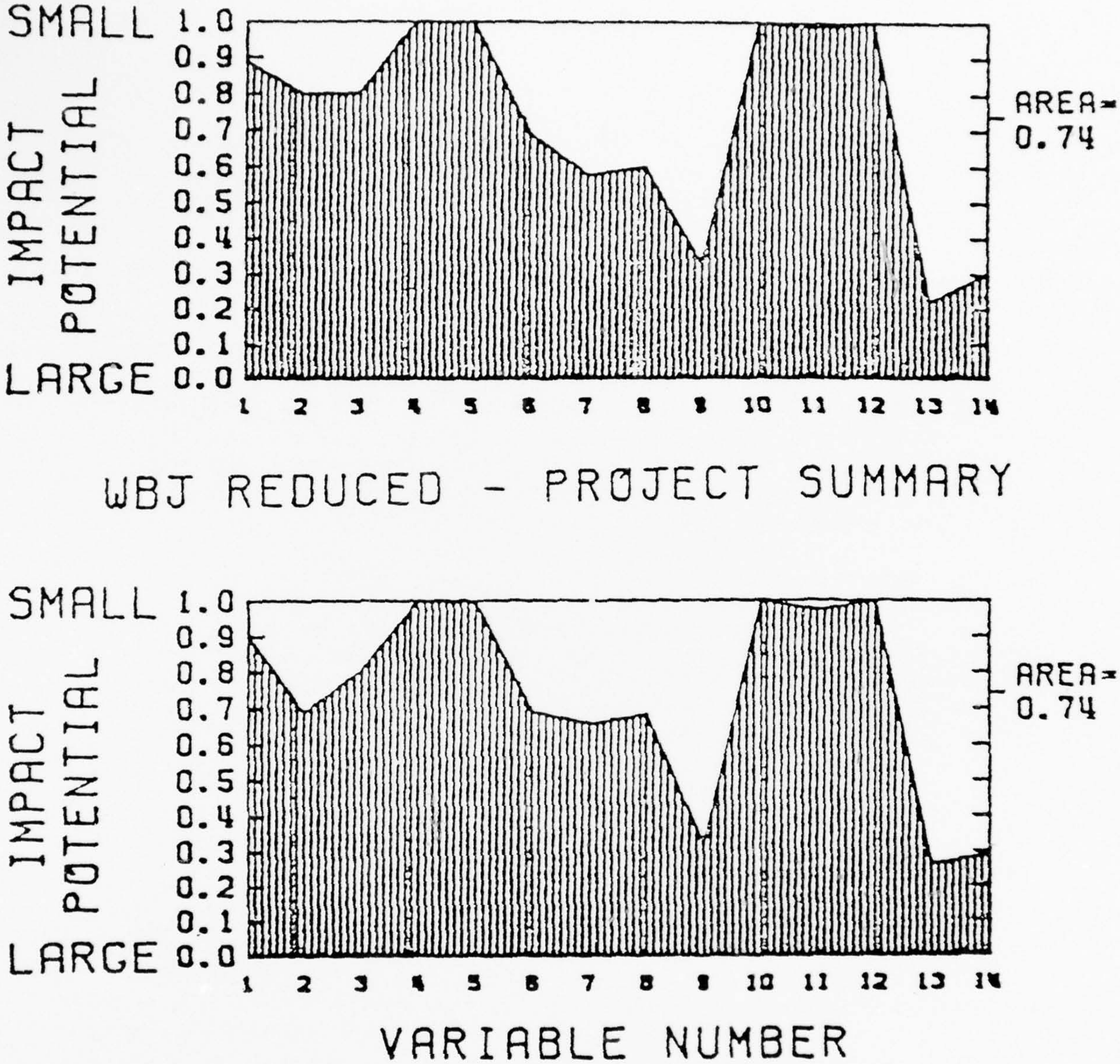
access around the protective structures. Connecting roadways and adjoining areas would be open to the majority of current land uses including agricultural uses and recreation. Area security would place restrictions upon the adjacent area as well as around the protective structure. The entire system would be served from one or two main bases located to minimize new construction and operation costs. Further environmental and engineering evaluation will be performed prior to selection of a site or sites for deployment. Volume IV of the FEIS discussed typical areas throughout the Western United States where potential basing could occur. In general, the areas used for basing mode comparison were divided between those publicly and those privately owned. The impacts upon biological and archaeological resources were greatest in undisturbed areas of the west, particularly existing military reservations. The social and economic impacts were found to be greatest in areas of private land holdings, with the degree of impact directly proportional to the number of land owners affected and the intensity of farming and related activities. In addition, the specific locations chosen for the MPS main base or bases would likely have localized significant social and economic impacts.

The analysis performed on the MPS system in the Milestone II FEIS has been displayed in the same fashion as used for the air mobile discussion. Figure 3.5-1 shows the impact profiles for the nominal AMST and the WBJ configurations. Figure 3.5-2 through Figure 3.5-8 show the impact profiles for the MPS, vertical shelter, point security, with nominal and expanded spacing options in each of the physical-biological regions discussed in the FEIS.

The peaks in these figures indicate relatively small impact potentials and the valleys represent relatively large impact potentials. Each figure summarizes the impact profile across a range of environmental concerns in a specific physical-biological region.

The sectors of the environment which contain large impacts range over the breadth of the 14 environmental variables of concern. For example, in the Texas-New Mexico plains, water quality and supply, recreation, and natural resources are all heavily impacted by the MPS system; whereas, in the White Sands area important impacts are associated with natural resources, archaeology, and (for expanded spacing) economic and local government issues. In the Luke-Yuma areas, large impact potentials are associated with water quality and supply, natural resources, public safety and archaeology.

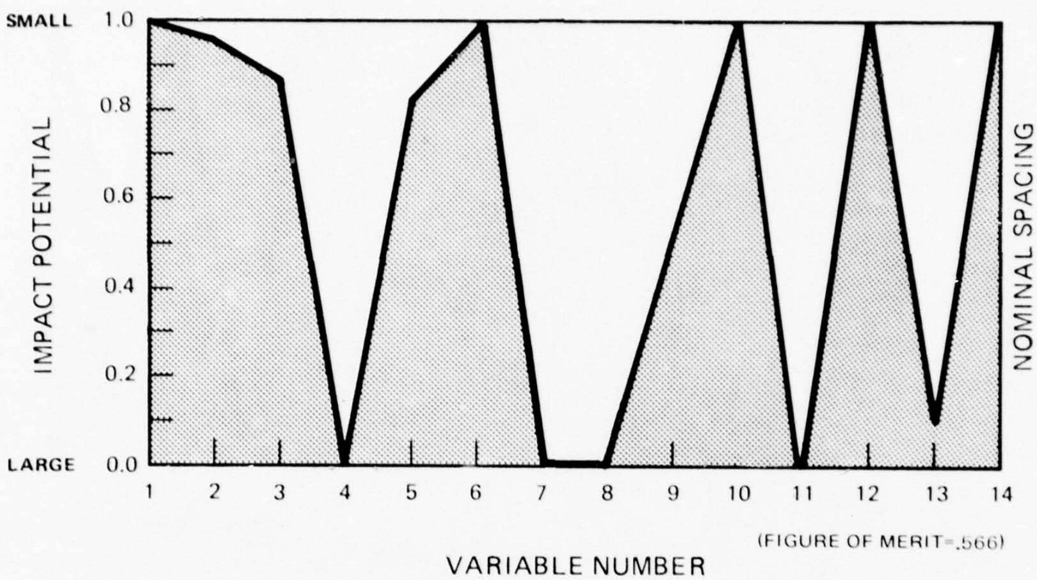
No single pattern of minor and major impact appears among the MPS impact profiles covering the seven study areas. The figure of merit for the air mobile impact profile is 0.74 and this value is bracketed by a range of MPS figures of merit which range from as low as 0.52 to 0.84.

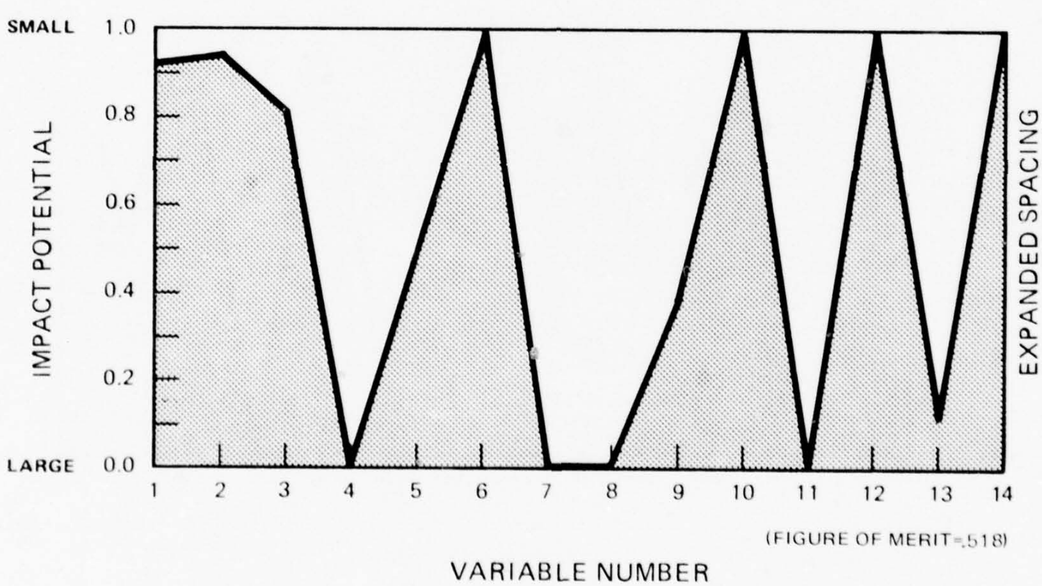


1. INTERFERENCE WITH IMPORTANT SPECIES
2. AIR QUALITY
3. WATER QUALITY AND SUPPLY
4. ACCESS LOSS (RECREATION)
5. NATURAL RESOURCES
6. LAND RIGHTS
7. ECONOMICS
8. LOCAL GOVERNMENT ISSUES
9. PUBLIC SAFETY
10. AIRWAYS IMPEDED
11. ARCHAEOLOGY
12. CONSTRUCTION MATERIALS (CEMENT)
13. ELECTRICAL ENERGY
14. NOISE

Figure 3.5-1. Air mobile parametric impact analysis AMST reduced — project summary

VERTICAL SHELTER, POINT SECURITY, FULL FORCE





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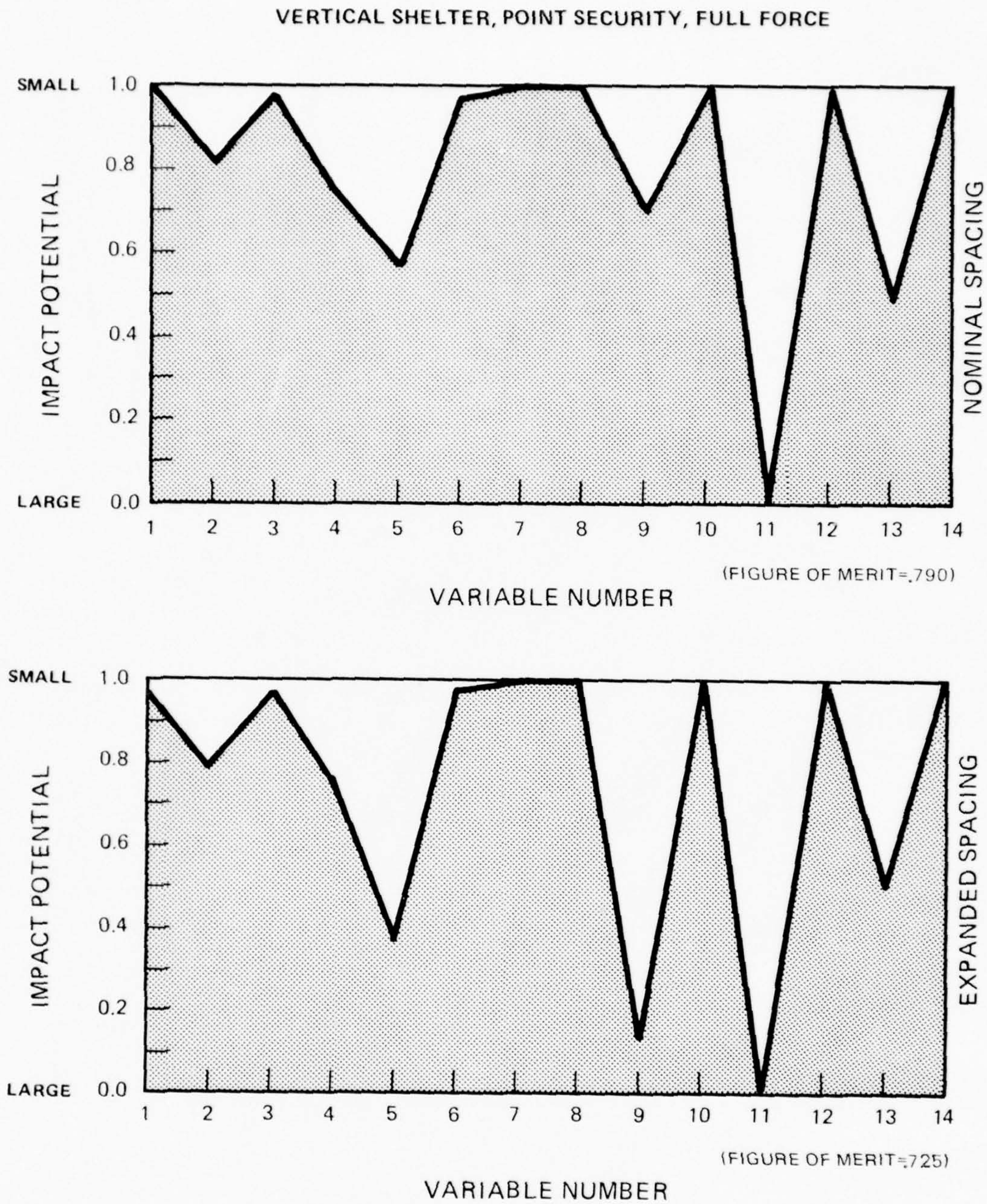
8. LOCAL GOVERNMENT ISSUES
9. PUBLIC SAFETY
10. AIRWAYS IMPEDED
11. ARCHAEOLOGY
12. CONSTRUCTION MATERIALS (CEMENT)
13. ELECTRICAL ENERGY
14. NOISE

Figure 3.5-2. Impact profile — MPS option
West Texas Rio Grande.



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6. LAND RIGHTS
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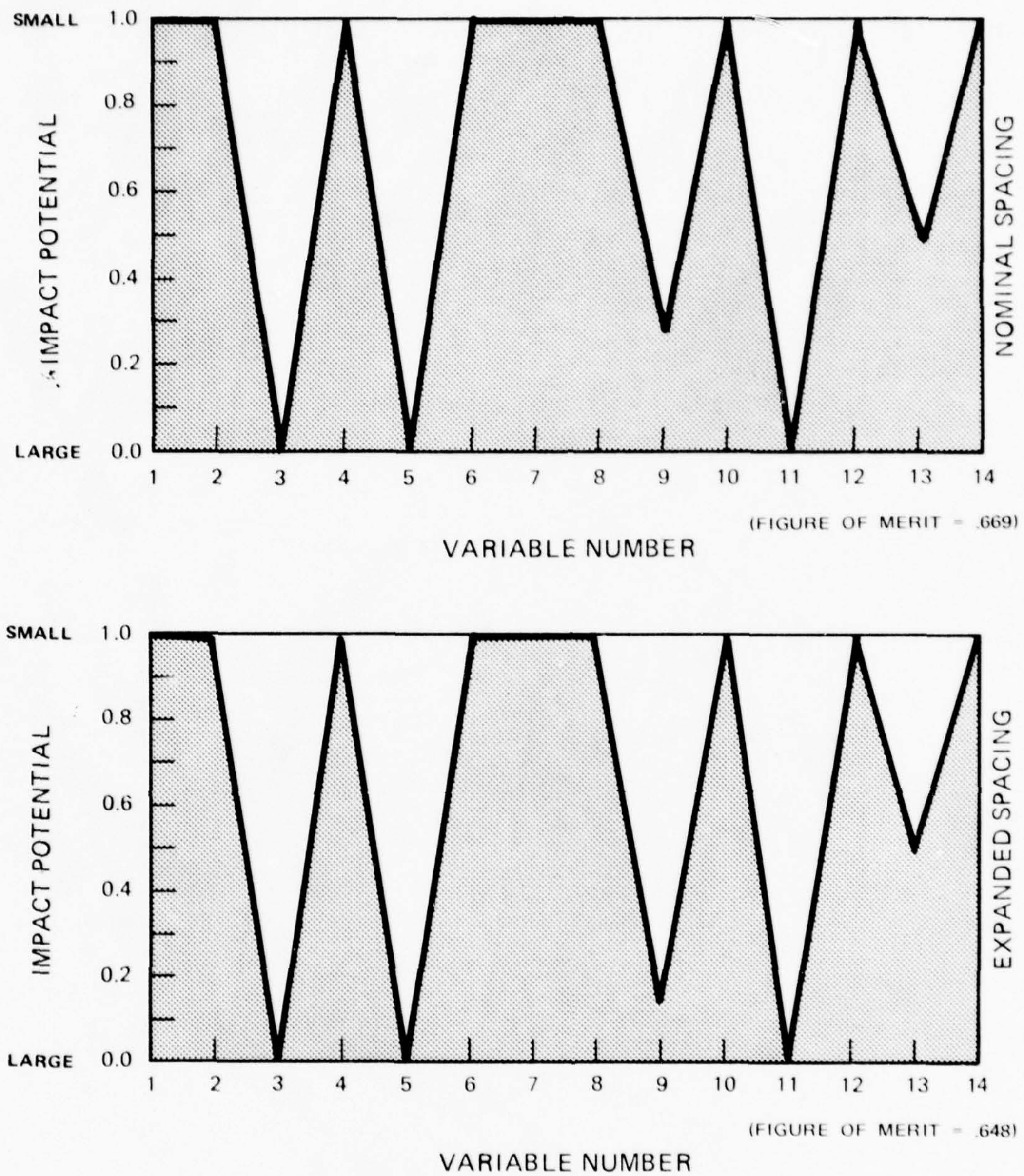
8. LOCAL GOVERNMENT ISSUES
9. PUBLIC SAFETY
10. AIRWAYS IMPEDED
11. ARCHAEOLOGY
12. CONSTRUCTION MATERIALS (CEMENT)
13. ELECTRICAL ENERGY
14. NOISE

Figure 3.5-3. Impact profile — MPS option California/Mojave.

VERTICAL SHELTER, POINT SECURITY, FULL FORCE



1. INTERFERENCE WITH IMPORTANT SPECIES
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3. WATER QUALITY AND SUPPLY
4. ACCESS LOSS (RECREATION)
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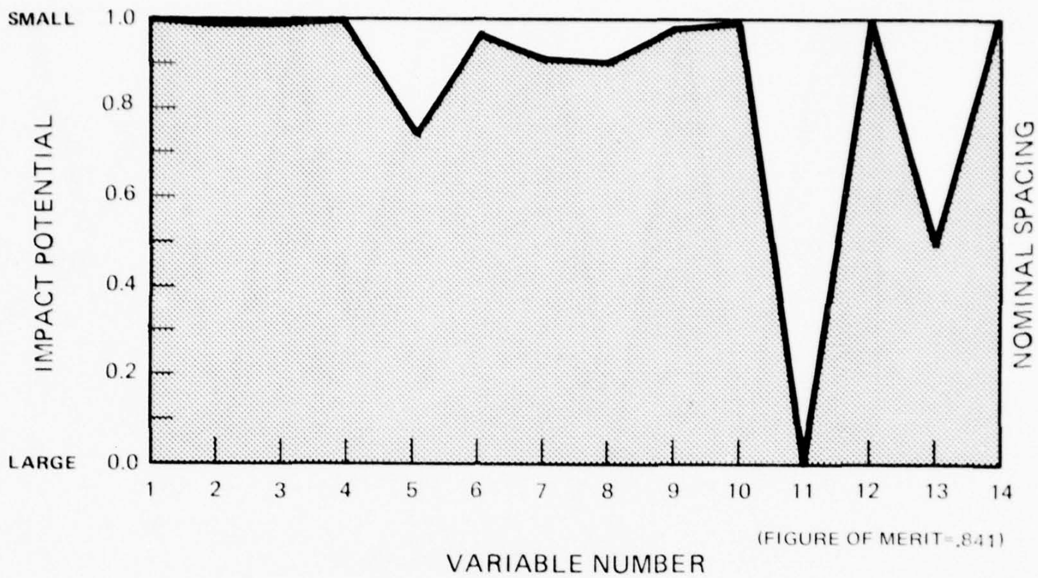
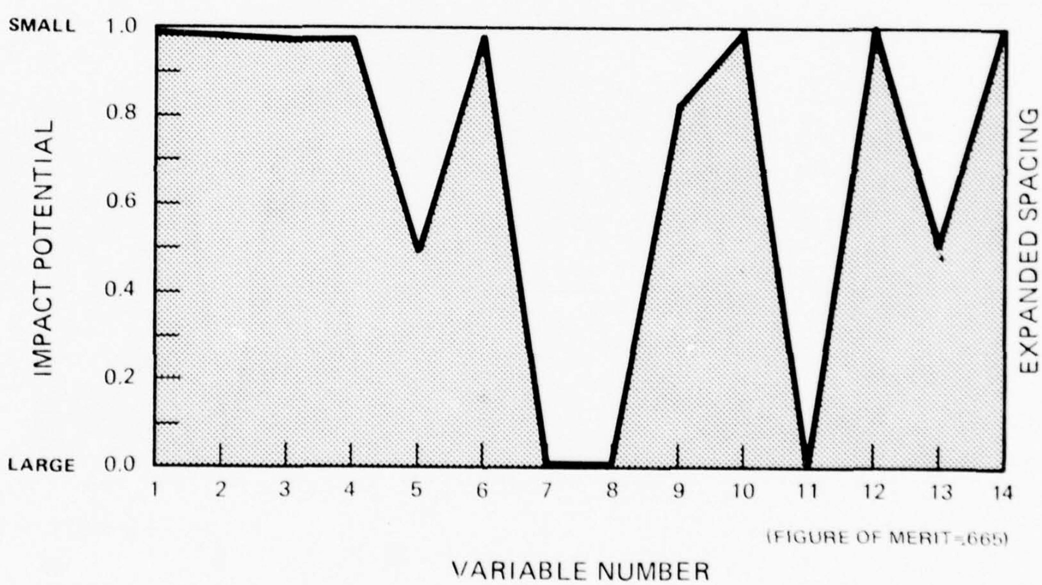
8. LOCAL GOVERNMENT ISSUES
9. PUBLIC SAFETY
10. AIRWAYS IMPEDED
11. ARCHAEOLOGY
12. CONSTRUCTION MATERIALS (CEMENT)
13. ELECTRICAL ENERGY
14. NOISE

Figure 3.5-4. Impact profile — MPS option Luke/Yuma.

VERTICAL SHELTER, POINT SECURITY, FULL FORCE





1. INTERFERENCE WITH IMPORTANT SPECIES
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4. ACCESS LOSS (RECREATION)
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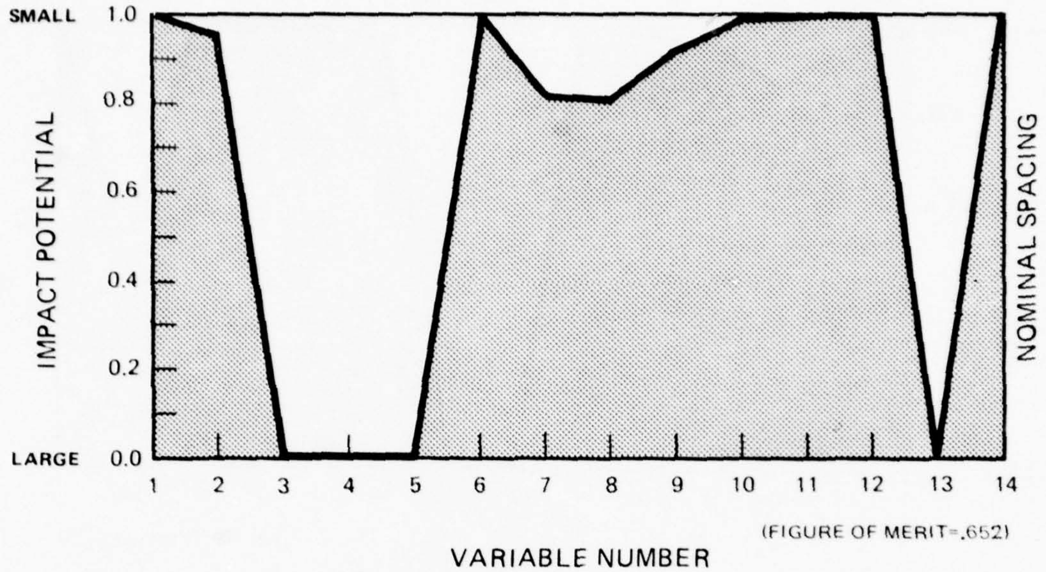
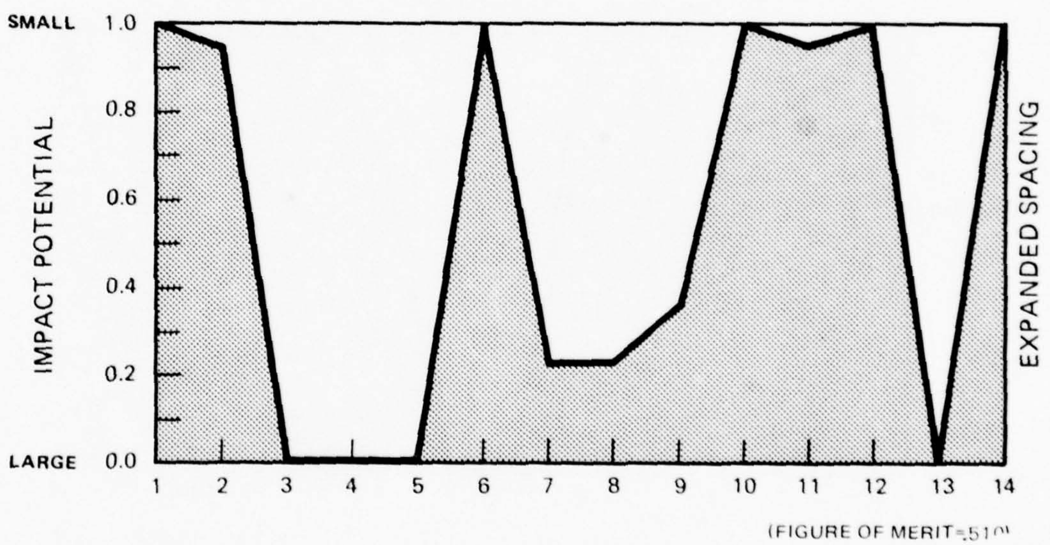
8. LOCAL GOVERNMENT ISSUES
9. PUBLIC SAFETY
10. AIRWAYS IMPEDED
11. ARCHAEOLOGY
12. CONSTRUCTION MATERIALS (CEMENT)
13. ELECTRICAL ENERGY
14. NOISE

Figure 3.5-5. Impact Profile — MPS option White Sands.

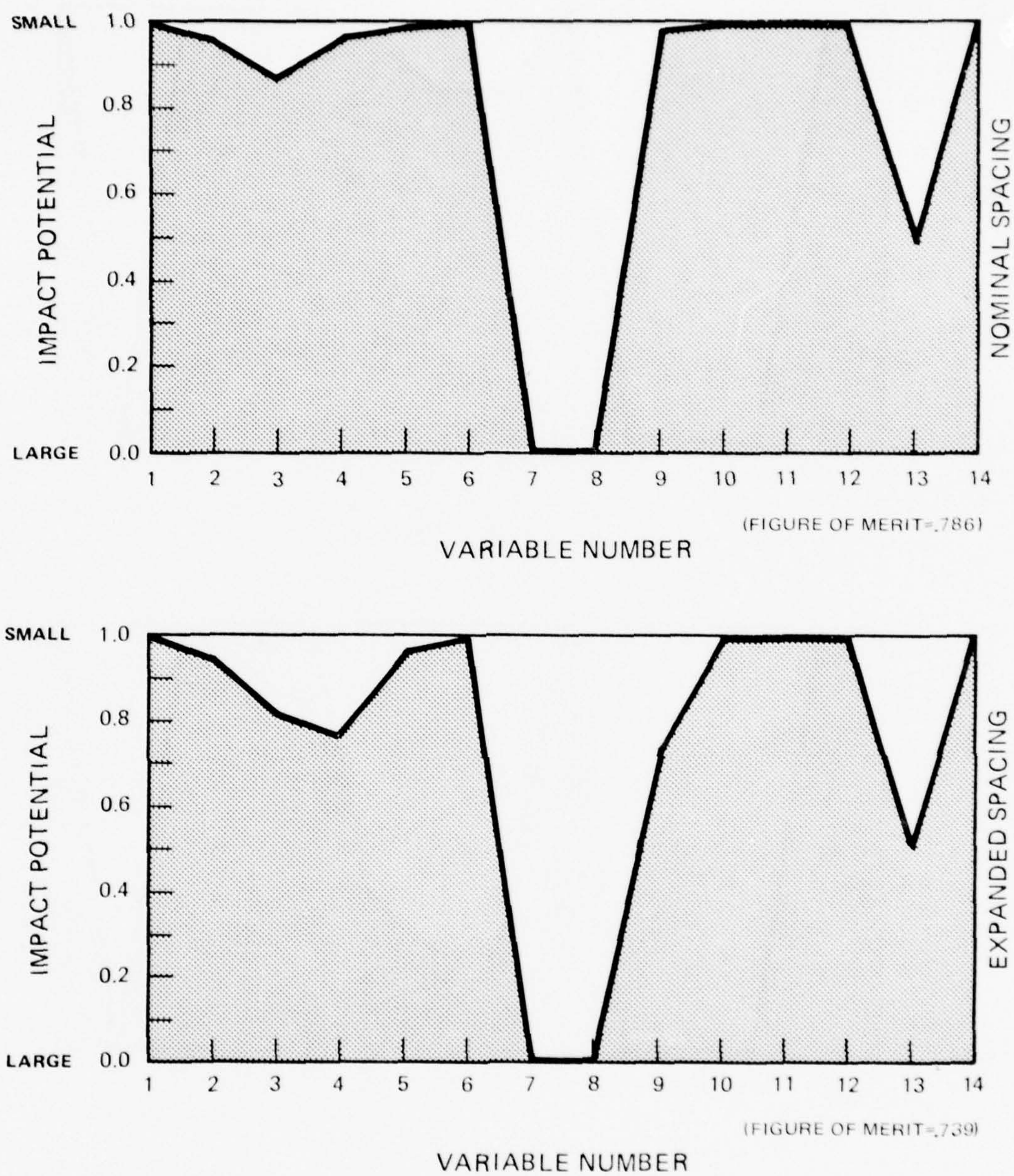




1. INTERFERENCE WITH IMPORTANT SPECIES
2. AIR QUALITY
3. WATER QUALITY AND SUPPLY
4. ACCESS LOSS (RECREATION)
5. NATURAL RESOURCES
6. LAND RIGHTS
7. ECONOMICS
8. LOCAL GOVERNMENT ISSUES
9. PUBLIC SAFETY
10. AIRWAYS IMPEDED
11. ARCHAEOLOGY
12. CONSTRUCTION MATERIALS (CEMENT)
13. ELECTRICAL ENERGY
14. NOISE

Figure 3.5-6. Impact Profile — MPS option Texas/New Mexico Plains.

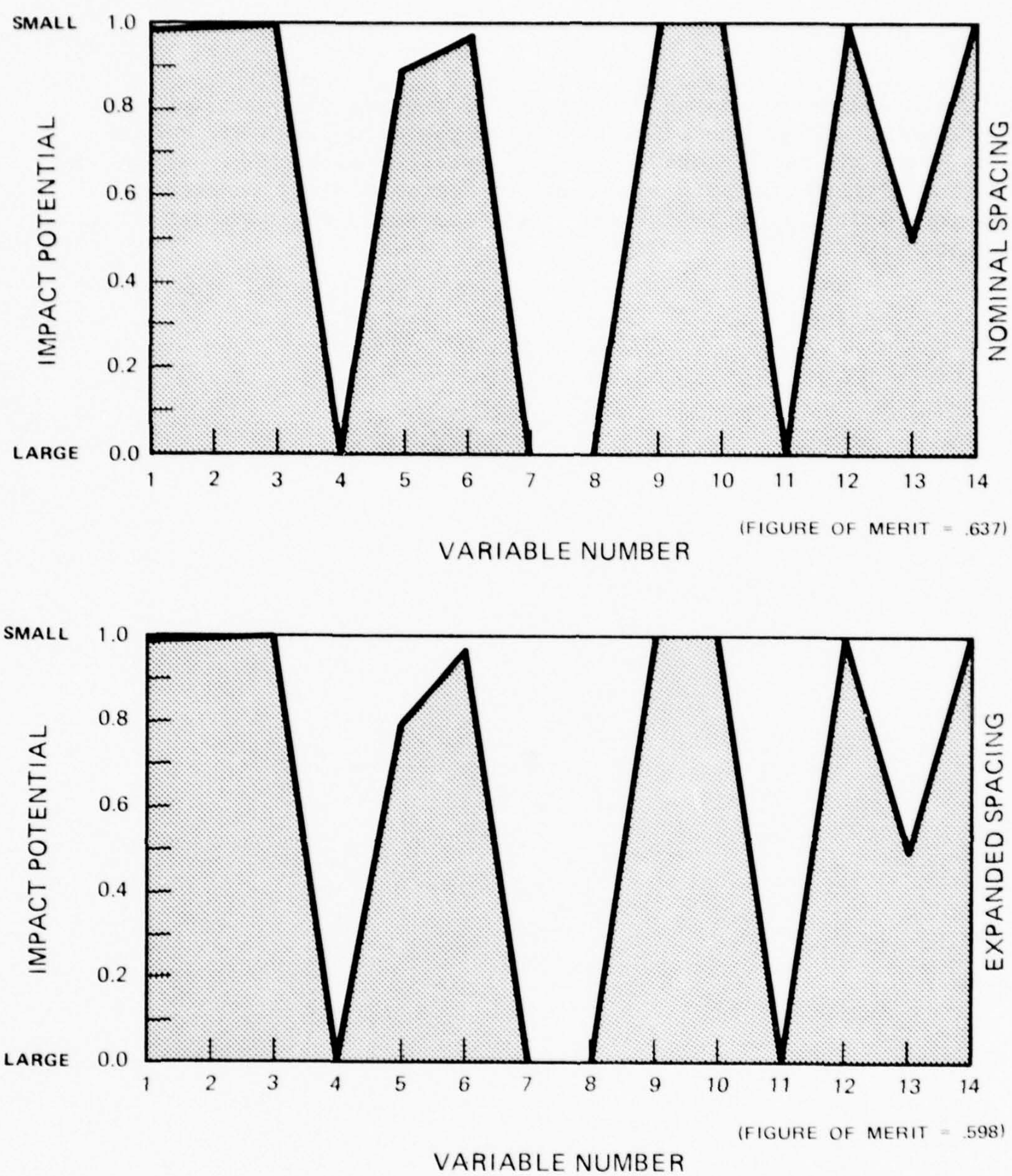
VERTICAL SHELTER, POINT SECURITY, FULL FORCE



1. INTERFERENCE WITH IMPORTANT SPECIES
2. AIR QUALITY
3. WATER QUALITY AND SUPPLY
4. ACCESS LOSS (RECREATION)
5. NATURAL RESOURCES
6. LAND RIGHTS
7. ECONOMICS
8. LOCAL GOVERNMENT ISSUES
9. PUBLIC SAFETY
10. AIRWAYS IMPEDED
11. ARCHAEOLOGY
12. CONSTRUCTION MATERIALS (CEMENT)
13. ELECTRICAL ENERGY
14. NOISE

Figure 3.5-7. Impact Profile — MPS option South Platte.

VERTICAL SHELTER, POINT SECURITY, 1/3 FORCE



1. INTERFERENCE WITH IMPORTANT SPECIES
2. AIR QUALITY
3. WATER QUALITY AND SUPPLY
4. ACCESS LOSS (RECREATION)
5. NATURAL RESOURCES
6. LAND RIGHTS
7. ECONOMICS
8. LOCAL GOVERNMENT ISSUES
9. PUBLIC SAFETY
10. AIRWAYS IMPEDED
11. ARCHAEOLOGY
12. CONSTRUCTION MATERIALS (CEMENT)
13. ELECTRICAL ENERGY
14. NOISE

Figure 3.5-8. Impact Profile — MPS option Central Nevada.

This lack of pattern and the wide range of figures of merit for MPS suggests that, within the range of siting variation, the air mobile option is roughly equivalent to an appropriately sited MPS. Additional evaluation of these impacts will identify site-specific or project mitigations which could change the peaks and valleys associated with the impact profiles.

4. ALTERNATIVES

This Supplement was prepared solely to examine the Air Mobile system. All other alternatives were addressed in the MX: Milestone II FEIS.

5. PROBABLE UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

5.1 POTENTIAL MITIGATION MEASURES

Socioeconomic effects largely result from the need for a sizable direct labor force to be imported to a region and potentially from the need to convert current land uses to the project. The direct labor force at MOBs will also bring families. Expenditures by these people, and expenditures to procure needed supplies, will stimulate the local economy but may create sufficient activity to induce additional migration to the region. The additional people will place new demands on housing, schools, wastewater system and similar publicly and privately-supplied goods and services.

Impacts associated with population growth are most directly mitigated by minimizing the number of USAF people that must be added to the existing complement at a base. Substantial effort has already gone into such a force size reduction and is expected to continue through FSED. Potential impacts at MOBs might further be reduced by permanently stationing some people at the alert facility. The number of such people would be small (10 to 30) and would not only reduce impact potentials at the MOBs but would be beneficial to the economies of communities near alert bases and might reduce life-cycle costs of the system. Fewer alert bases per MOB would also reduce personnel requirements at each MOB but might increase total personnel requirements or costs. Impact potentials are further reduceable by siting MOB in areas with large economies and avoiding areas with small economies. Where growth related impact potentials are still anticipated to be large, Economic Development Administration Title IX assistance might be available. Financial assistance is available to local schools that educate military dependents.

Potential land use impacts may be mitigated by maximizing reliance on existing military bases for use as MOBs or alert bases. Site dependent impacts may still occur and appropriate mitigation will be developed in the subsequent deployment area selection EIS. Every effort will be made to avoid use of prime farmland or relocation of people.

An attempt will be made to avoid areas of known high archaeological sensitivity during siting. All construction areas will be surveyed and an appropriate mitigation program, including data recovery programs as necessary, will be implemented after consultation with State Historic Preservation Officers and the Advisory Council on Historic Preservation.

Noise effects will result from aircraft takeoffs, landings, taxiing, and engine runup. The Air Force has an existing program, the Air Installation Compatible Use Zone (AICUZ), that encourages compatible land uses within the noise impact contour. The selection of existing USAF bases with extensive air operations already will mitigate most noise impact potential since the increase attributable to Air Mobile operations will be minimal. At new alert bases, the orientation of runways will minimize impacts. Where this is not possible due to operational requirements, alternative sites may be considered. Occasional exceptions for training operations may be required.

Potential mitigation measures for air quality effects are essentially source-control measures. The sources of pollutants for the operational phase of the Air Mobile system are aircraft engine exhaust emissions and emissions from the ground activities to support the aircraft, including emission levels from population growth.

Mitigation in both cases amounts to conserving fuel or energy or improving source performance. For aircraft mitigation includes minimizing engine runups and taxi times (also a noise mitigation), effective vapor control during fuel storage and handling, and careful mission planning to improve fuel efficiency. For population growth, car pools, shortened travel distances (and times) and energy conserving work procedures are appropriate mitigation techniques.

Air quality mitigative measures for an alert base are related primarily to replacement and support aircraft since ground support activities and personnel requirements will have little effect on air quality under present project scenarios. Appropriate mitigation measures are to eliminate unnecessary flights through careful manifest planning, and a reduction in the number and length of time engine checks are performed. The amount of such activities at an alert base is very small and any mitigation measures implemented would not be expected to have any measurable effects, although energy consumption and equipment wear would be reduced.

The largest potential for impact on water supply will occur if a main operating base is located in any of the potential project areas which have either physical or legal water constraints. These areas are mainly in the western part of the study area. One mitigation measure is to site MOBs only at locations with sufficient water.

Deployment of the Air Mobile basing option in the Central CONUS may impact natural resources and important (game, domestic, threatened/endangered) species. These impacts would result primarily from loss of vegetative cover and wildlife habitat during construction of alert bases and expansions of existing bases. The impacts would be localized, and will be mitigated by avoiding sensitive areas during siting.

Natural areas and habitats for important species (e.g., wetlands for waterfowl and prairie dog towns that might harbor the endangered black-footed ferret) are small and scattered. These sensitive areas will be avoided by incorporating the appropriate considerations in the siting studies. The impact on aquatic habitats will be mitigated by use of soil stabilization basins (berms) as necessary to minimize runoff of sediments and substances such as concrete washings or asphalt. Channelization of drainage from the base to a sedimentation pond or percolation area will minimize direct runoff of chemical surface waters and expedite clean up measures if these are necessary.

Impacts on energy supply, particularly electrical energy, can be at least partially mitigated by avoiding siting in areas where projected energy availability forecasts insufficient supply. This, however, includes most of the North Central study area and may not be viable. Energy impacts can also be mitigated by reducing per capita requirements. Appropriate measures include controlling heating and cooling requirements, insuring adequate insulation for all new construction and minimizing outdoor lighting. Additionally, preferential parking for car pools and providing housing within walking distance of work areas will minimize the need for gasoline.

5.2 UNAVOIDABLE ADVERSE EFFECTS

- At MOBs located in areas with small economies and populations, growth will cause impacts on housing, land use, schools, and other publicly and privately supplied goods and services. A potential for very rapid growth exists in areas with low urbanization.

- Diversion of large amounts of resources (labor, materials, fuels, and money) from other potential uses.

- Increased noise levels primarily in the vicinity of MOB and at new alert bases. This may constrain future land uses of adjacent areas.

- Disruption of up to several tens of square miles of surface for runway, support facility and associated construction. This disruption will adversely affect archaeological and biological resources.

- Loss of prime agricultural land to the extent that new alert bases may be required in prime agricultural areas.

- Water quality degradation due to runoff from construction areas and chemicals used in runway deicing. These effects may be less than those currently caused by agricultural activities in the selected areas and cannot be determined until siting studies are performed.

6. RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND LONG-TERM PRODUCTIVITY

The potential impacts associated with Air Mobile basing have been divided into long-term and short-term impacts as summarized in Table 6-1.

7. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Relocation of people will be small with the Air Mobile basing mode but will be an irreversible impact. Private land acquisition is not reversible at the termination of the project.

Major commitments of human and economic resources will be made during the life of the project. The use of human resources for construction and operation of the project is considered an irretrievable loss in the sense that it will preclude personnel from engaging in other productive activities. This is true of both the direct and the indirect and induced effect of the project investment. These are not, however, irreversible commitments since they can be applied to other projects at the end of this project.

Local governments in the vicinities of MOBs will have to commit resources to meet the needs of the project-induced growth, which will preclude making alternative uses of such resources. The expansion of infrastructure will, to large extent, be irreversible although some of the facilities could be put to alternative uses once project-induced demand is diminished.

Table 6-1. Summary of potential short-term and long-term impacts.

ANTICIPATED CONCERNS	SHORT-TERM	LONG-TERM
Important Species	Adjustment to adjacent areas if new alert bases required Sensitization period for aircraft noise	
Air Quality		Localized increased emissions near MOBs
Water Quality and Supply	Potential for runoff from deicing (urea) but should be less than from agriculture	
Natural Resources		Loss of habitat and vegetative cover Increased noise where new alert bases required
Land Rights		A small number of inhabitants may be displaced and small amounts of private land may be required
Economics	Some pressure on construction wages and prices may be felt, particularly near MOBs located in a small community	Loss of some prime farm land Substantial local growth at MOBs near small economies
Local Government Issues		Severe impacts on public services may be felt in smaller areas Housing shortages in small communities
Archaeology	Careful siting of new bases could keep archaeological disruption to a minimum	Some archaeological sites may be lost and data recovery progress will remove archaeological resources from their current context

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Table 6-1. (Continued)

ANTICIPATED CONCERN	SHORT-TERM	LONG-TERM
Construction Materials	Short-term disequilibrium in demand and supply may occur	
Energy	Increased POL consumption	May require transmission or generating facilities in some areas
Noise	Increased noise levels from aircraft operations at all sites but potentially significant only at new alert base and intermittantly there	
Safety		

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The importation of several thousand people to an area represents a reversible, but long-term, impact. Provision of various facilities (roads, water and waste water treatment, and housing) is essentially an irretrievable commitment of labor, materials and capital. Provision of services (teachers, policemen, firemen) also involves labor and monitoring expenditures that are irretrievably committed. Revenues lost to local governments because currently taxable land is removed from the tax rolls will be irretrievably lost. This process of loss will be reversible at the end of the project life.

Disruption of an archaeological site, is an irreversible, irretrievable impact. The scale of the project is such that in spite of the best available methodology and care in recovery, some archaeological data may inadvertently be lost.

Use of most construction resources is irreversible. Much if not all of the cement, sand, aggregate, steel and man-hours used cannot be reclaimed. Fossil fuel and electricity used during construction and operation are irreversible and irretrievable commitments of resources. The materials that could be recovered after termination of the project depend upon the demand and developed technology at that time but is not expected to be large.

The energy used in construction and operation of the MX system represents an irreversible and irretrievable commitment of resources. Production of the electric energy will require additional materials and energy commitments in the deployment region which will also be irreversible.

No irreversible impacts to important species are expected to occur as a result of deployment of Air Mobile MX. Use of natural resources is an irreversible commitment that is expected to be very small for Air Mobile deployment. Only the area upon which permanent structures, such as runways and buildings, are placed would be lost. Areas in which vegetation is modified or maintained at a low stature would be able to recover after the life of the project but this may require more than 100 years in hardwood forest areas.

8. CONSIDERATIONS THAT OFFSET THE ADVERSE IMPACTS

These considerations parallel, and do not differ from those considerations discussed in the MX:Milestone II FEIS.

9. SITES OF UNRESOLVED ISSUES

As stated in the preface, this supplement is based on a range of system parameters which are representative of the air mobile concept.

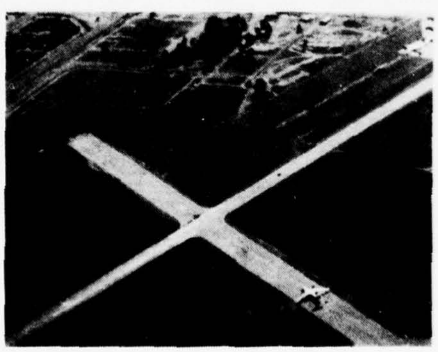
These parameters are important in predicting environmental effects and will be further defined if the air mobile concept enters FSED:

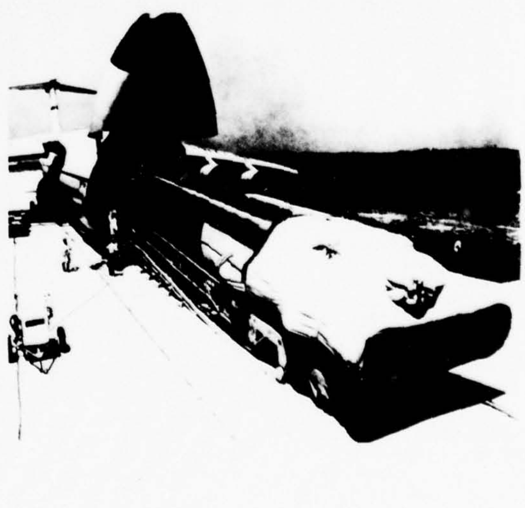
- Number of MOBs, new and co-use alert bases and dispersal sites
- Location of MOBs, alert bases and dispersal sites
- Type and number of aircraft
- Size and number of missiles
- Number of support personnel required at MOBs and alert bases
- Nature of new, co-use military and co-use civilian alert bases
- Safety and security at MOBs and alert bases
- Number of crews required per aircraft
- Costs for development, production, deployment and operation
- Resource requirements for construction, production, deployment and operation

The MX FSED program is planned to take about 5 years. During this time the Air Force will conduct an environmental program which includes the preparation of two EISs in addition to the MX:Milestone II FEIS and this supplement: a deployment area selection EIS and a deployment EIS. These additional statements will reflect progress made during FSED; will narrow and more precisely define the range of system parameters; will allow more specific analysis of anticipated environmental impacts; and will provide additional opportunities for public review and comment.

V

Appendices





CONTENTS

INTRODUCTION

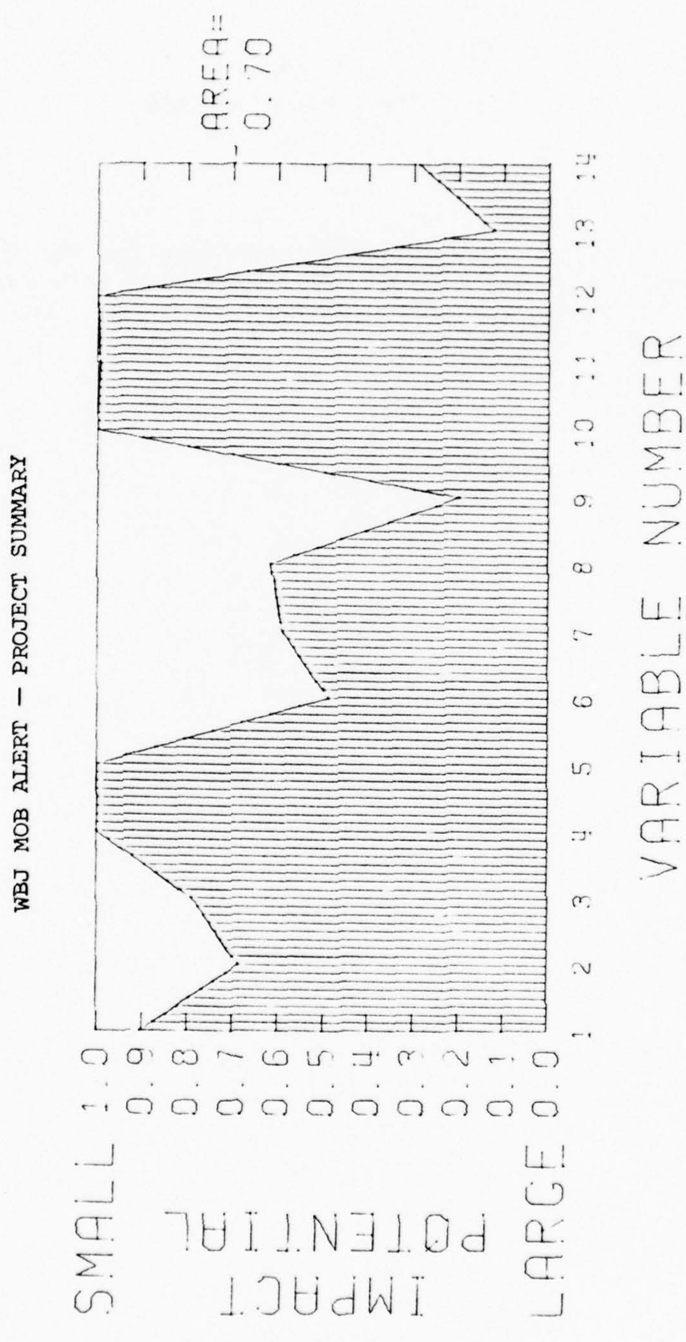
Chapter 5 contains a series of technical appendices to this document, as well as lists of rare/endangered plant and animal species, a distribution list of report recipients, glossary and acronyms, and a complete list of references used in this supplement to Chapter 2 MX: Milestone II FEIS.

A

SRM IMPACT PROFILES

A
SRM IMPACT PROFILES

A series of impact profiles was produced for the air mobile option which showed the sensitivity of the SRM results to changes in the primary factors and decreases in the deployment area. Only the summary results are presented in this section.



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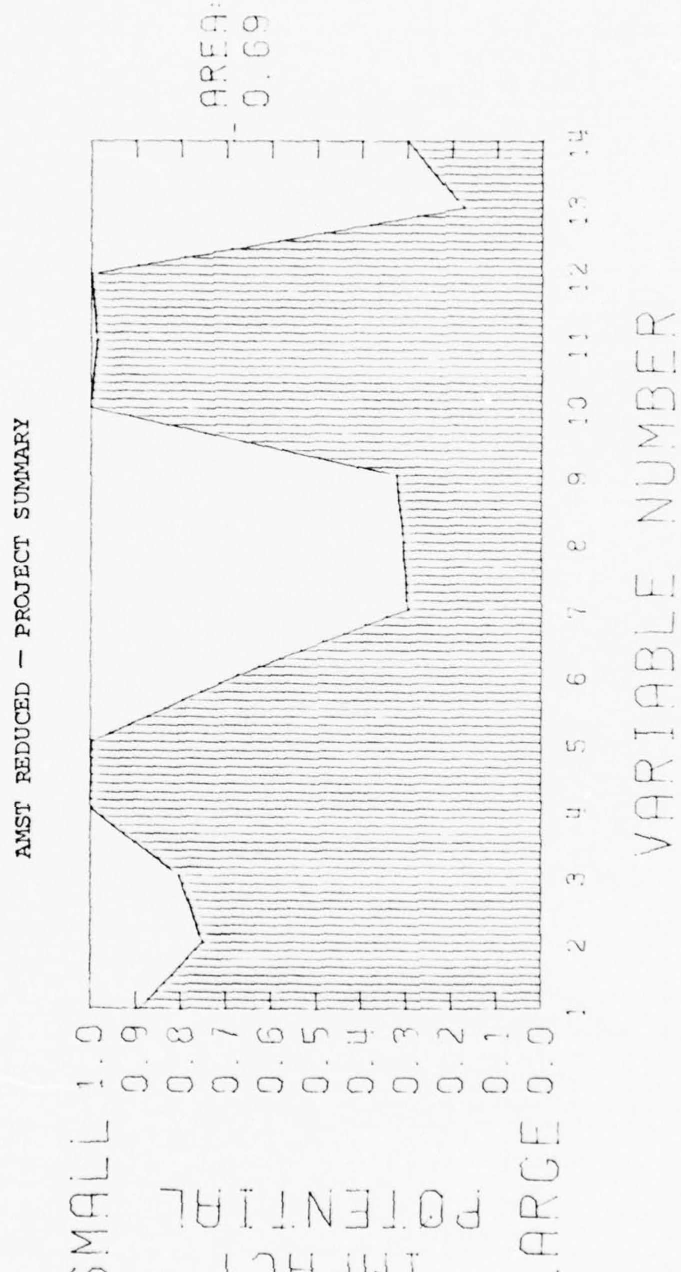
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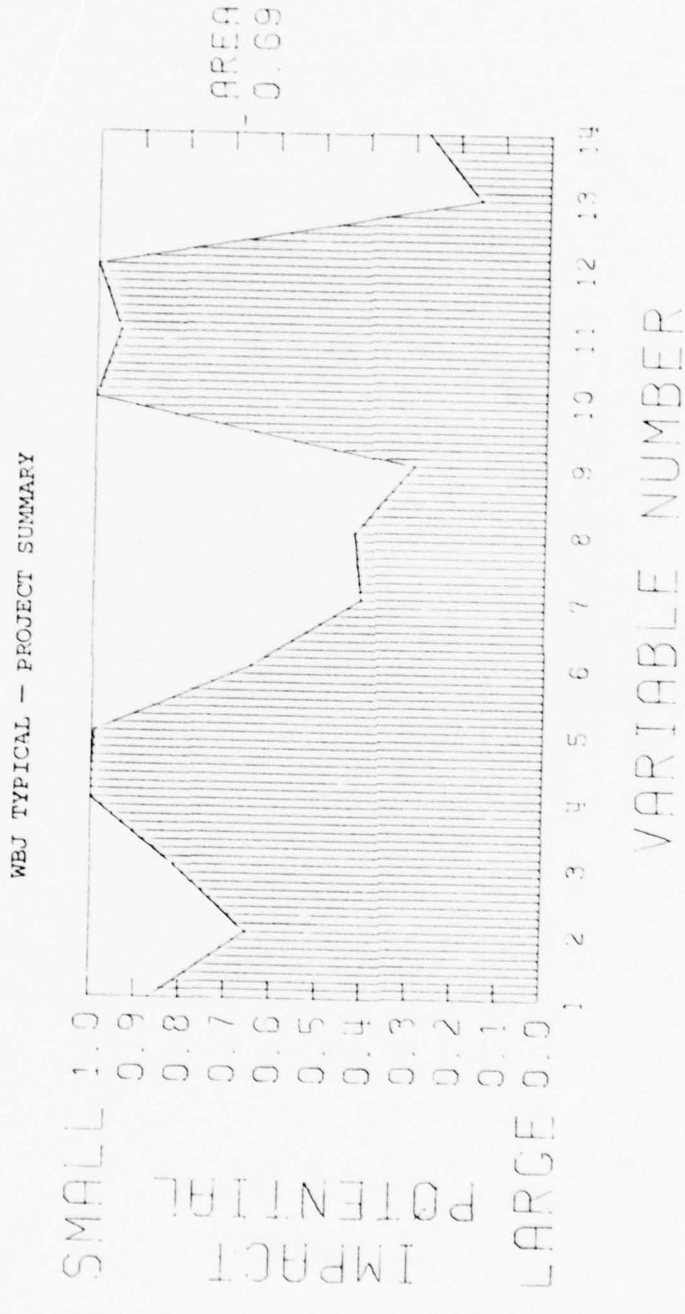
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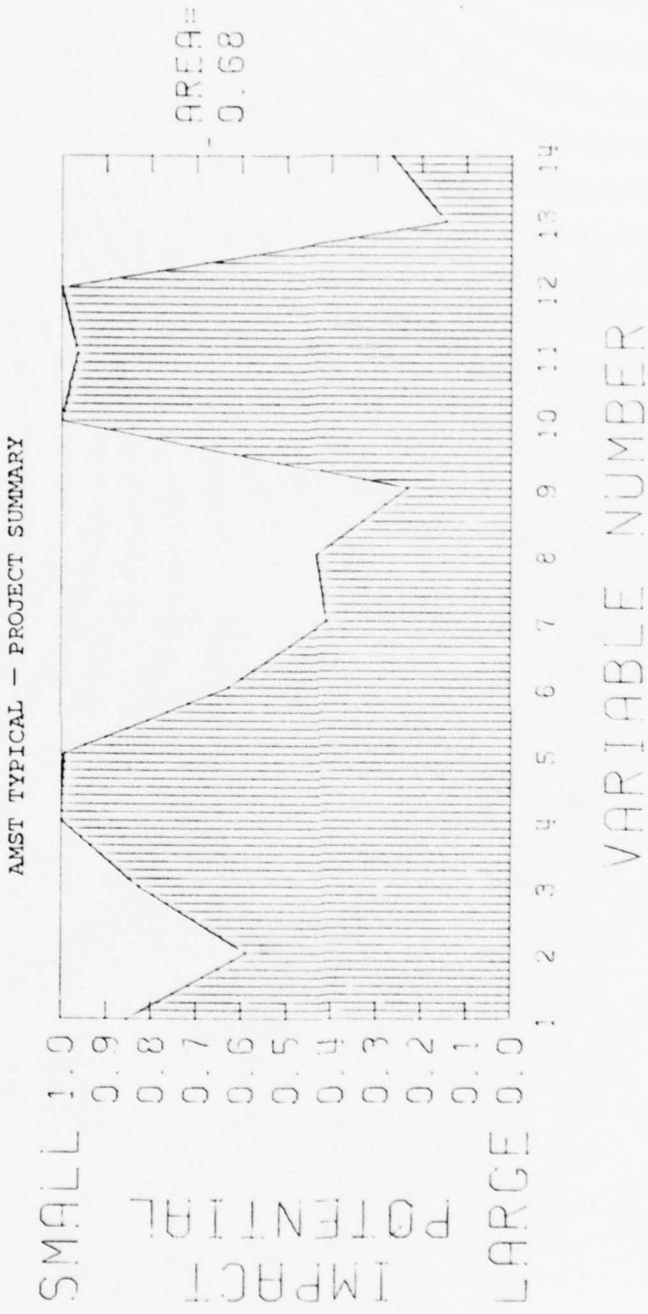
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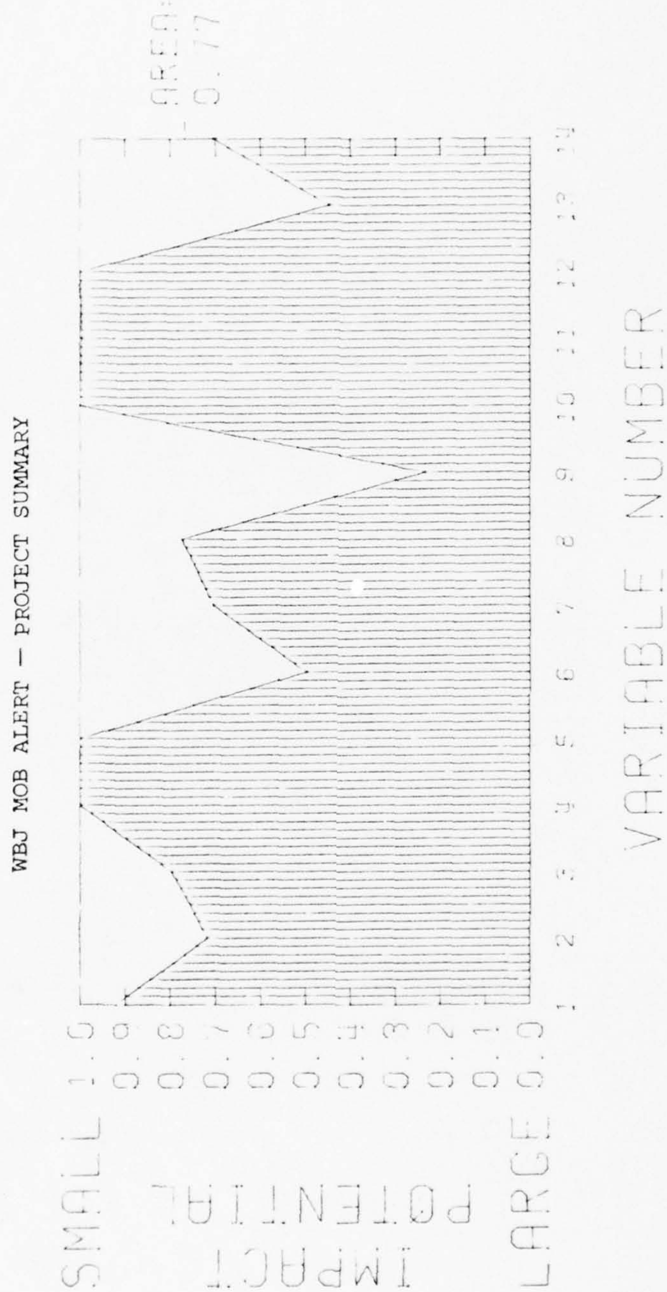
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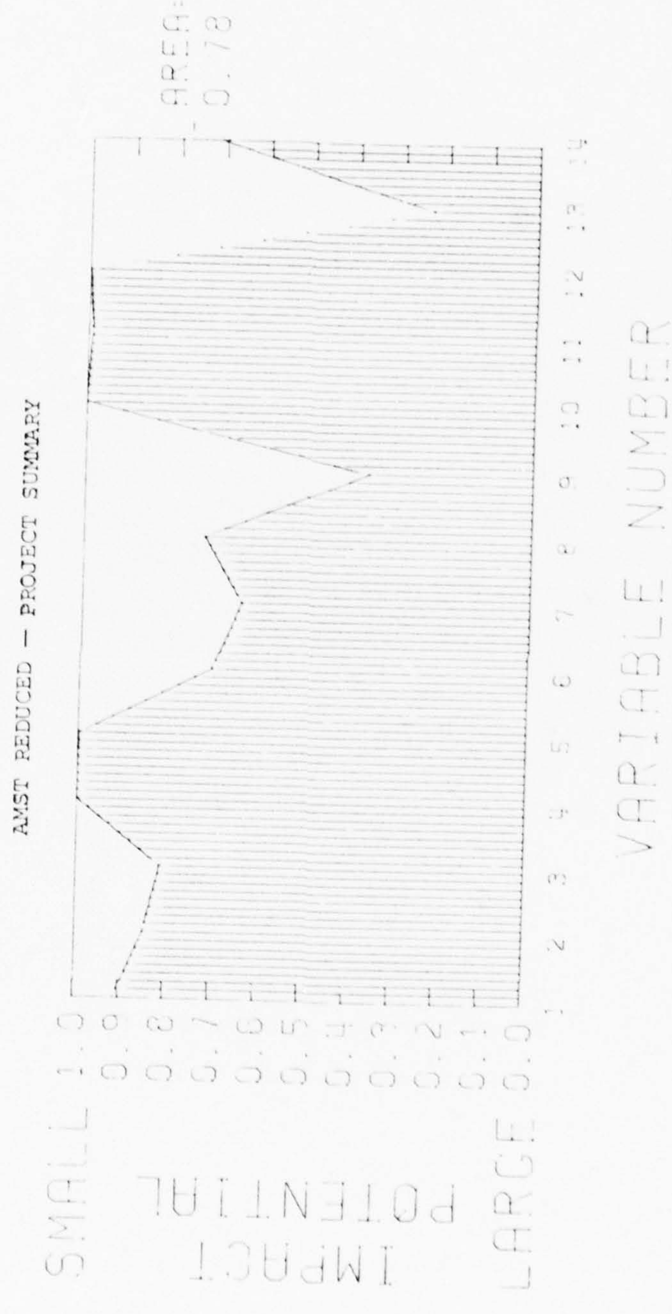
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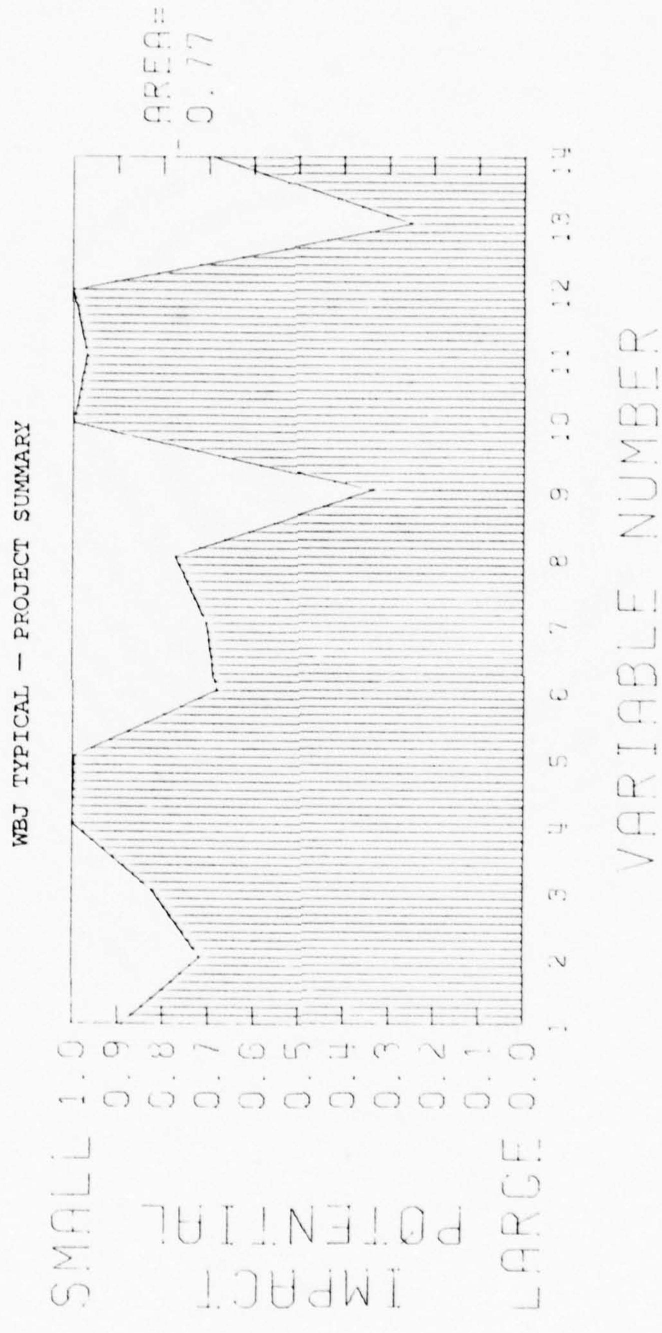
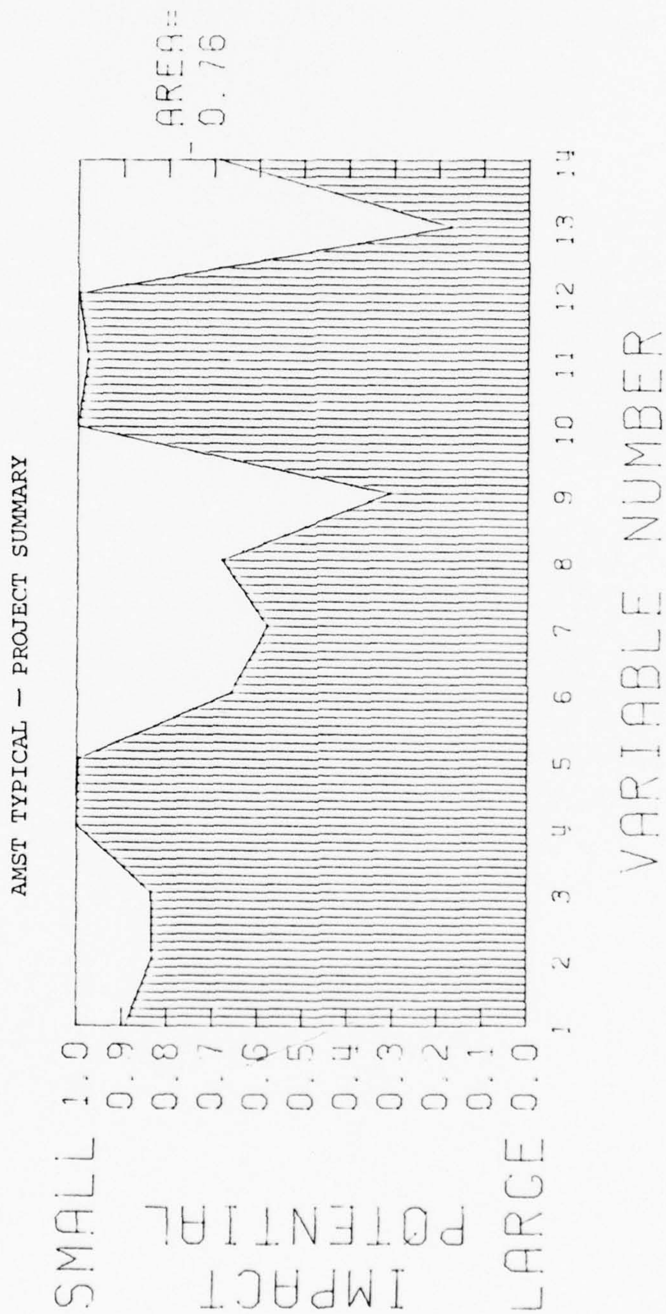


A-10 Air Mobile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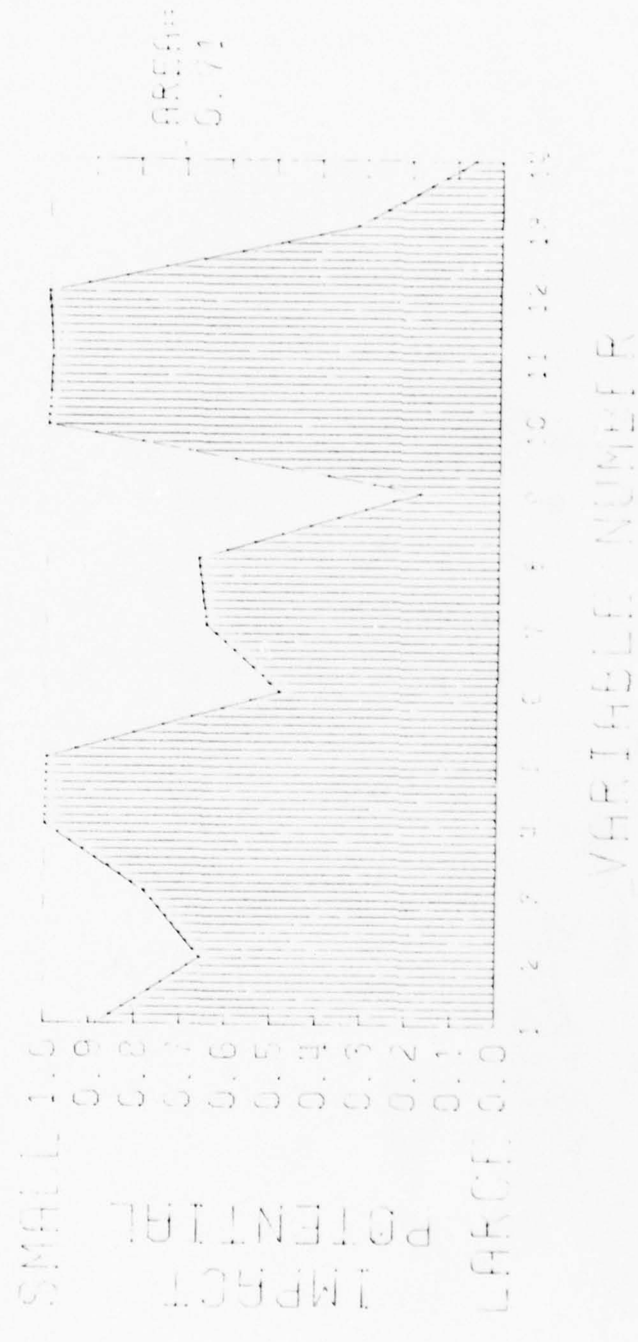

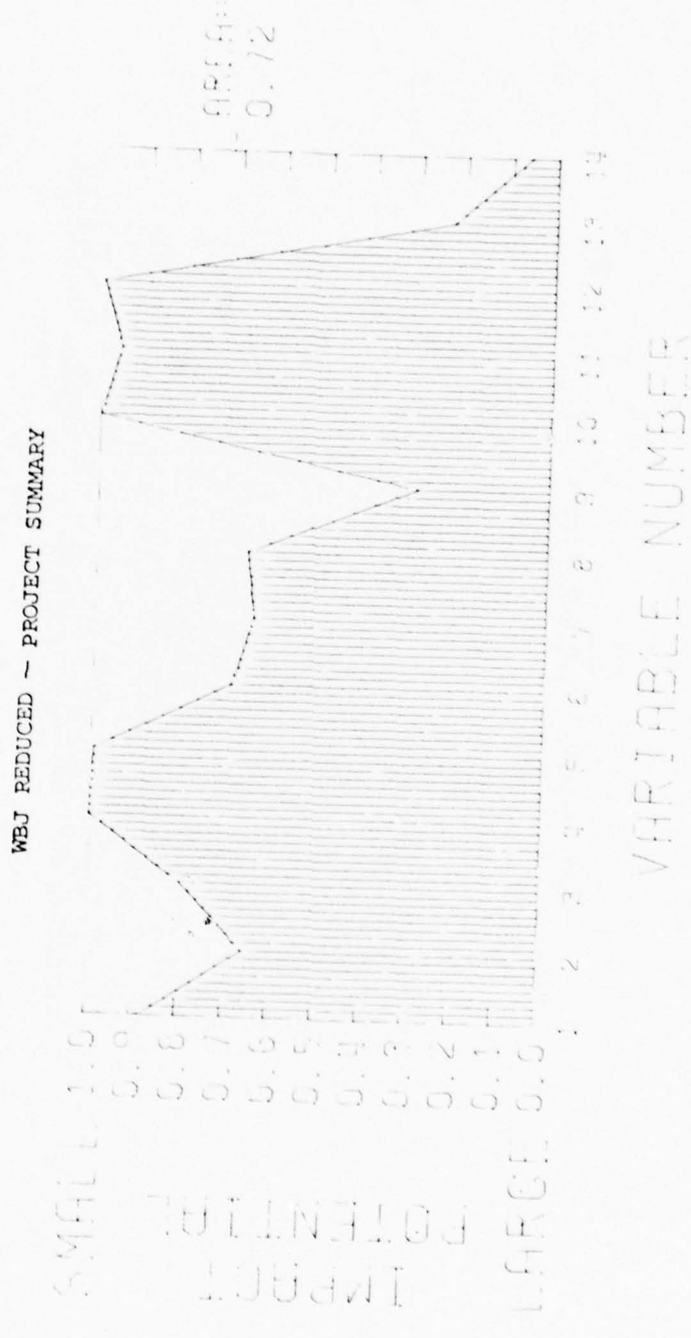
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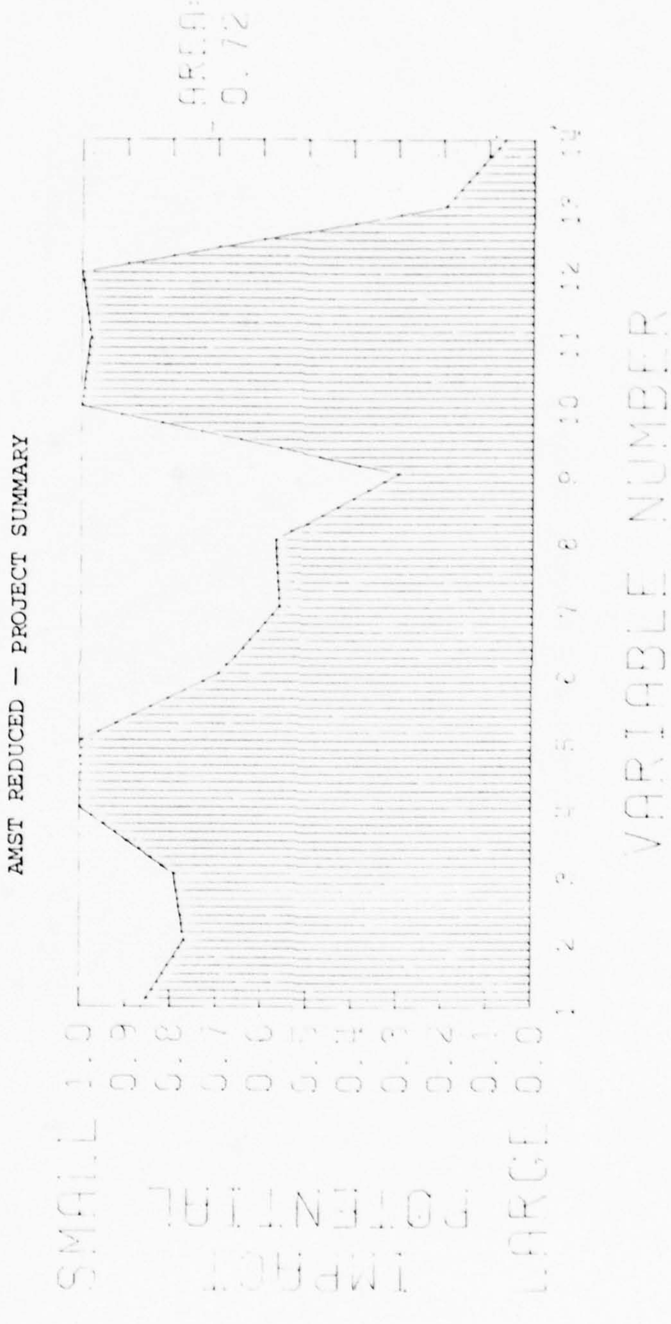
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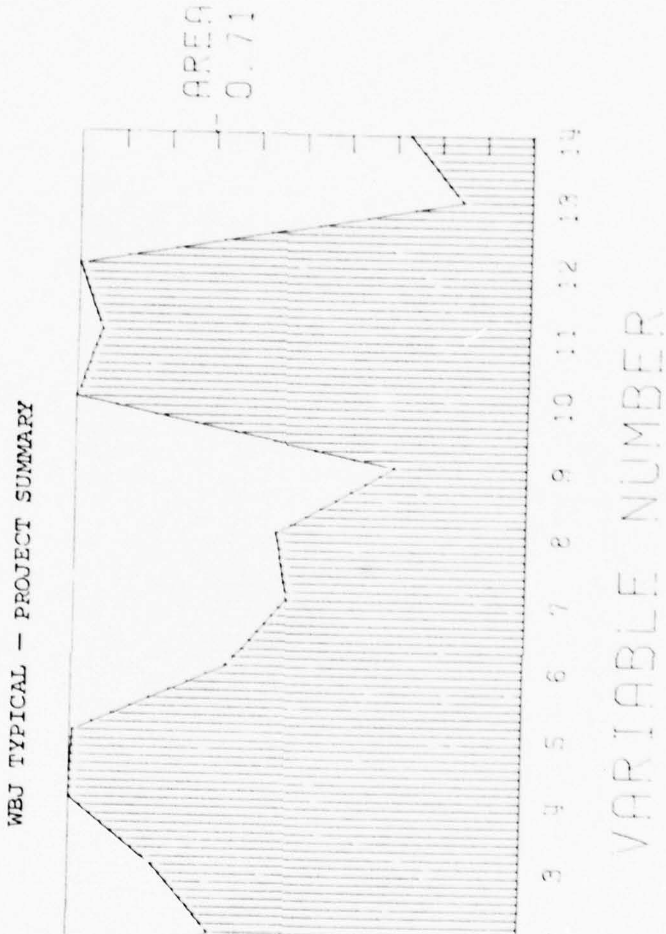
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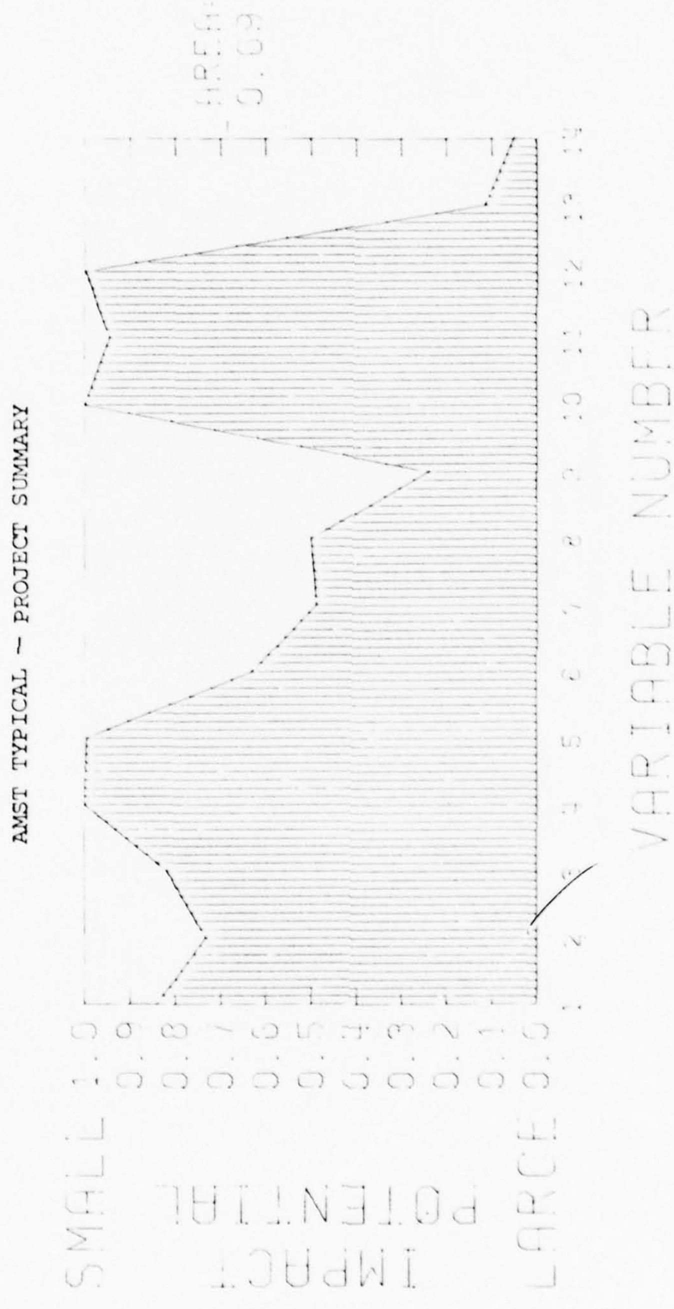
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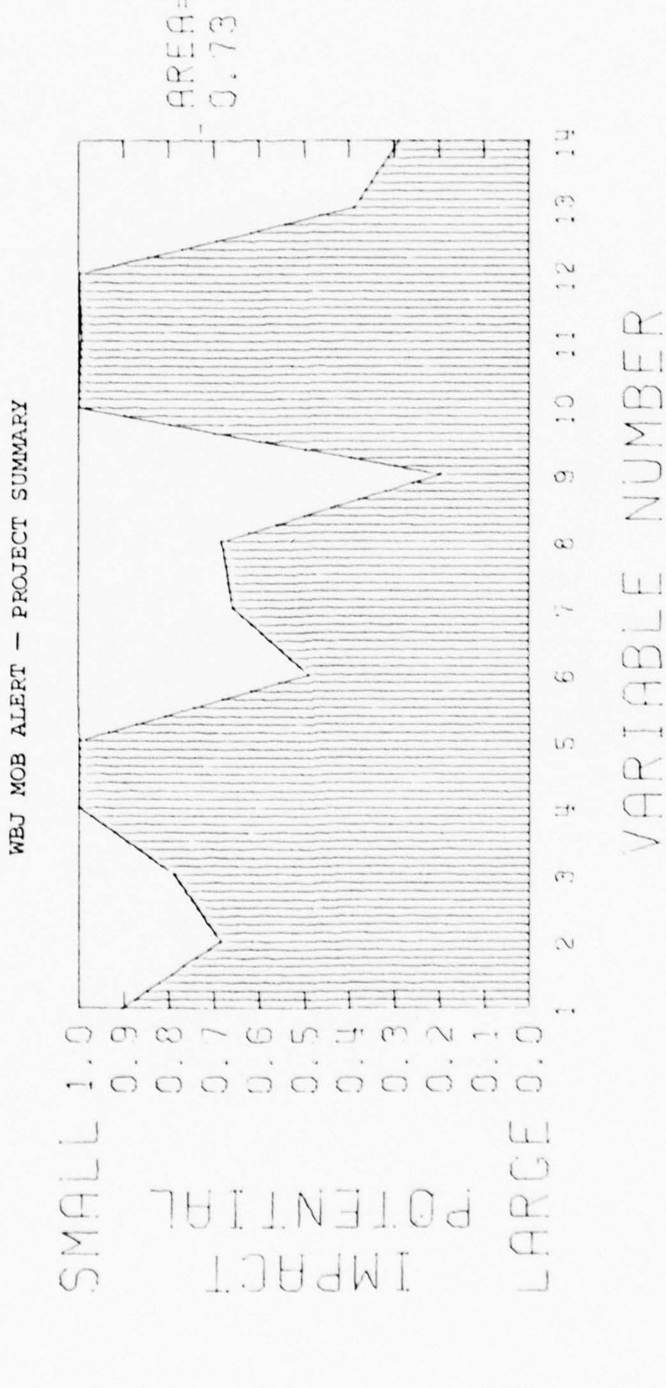
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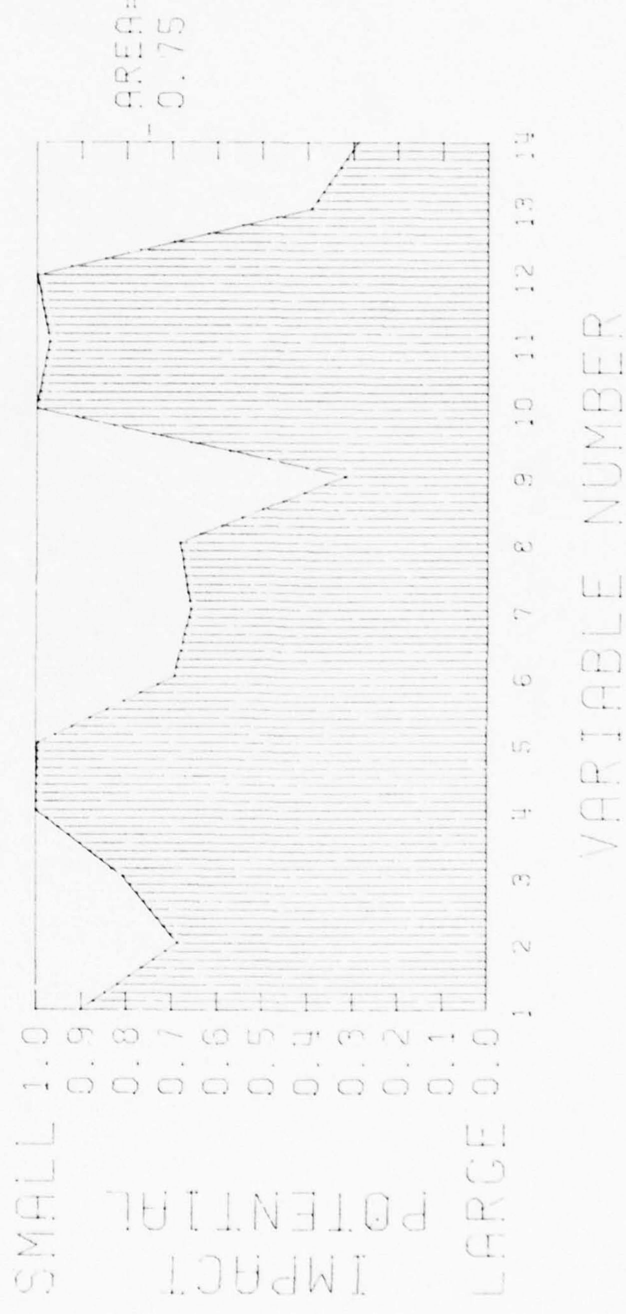

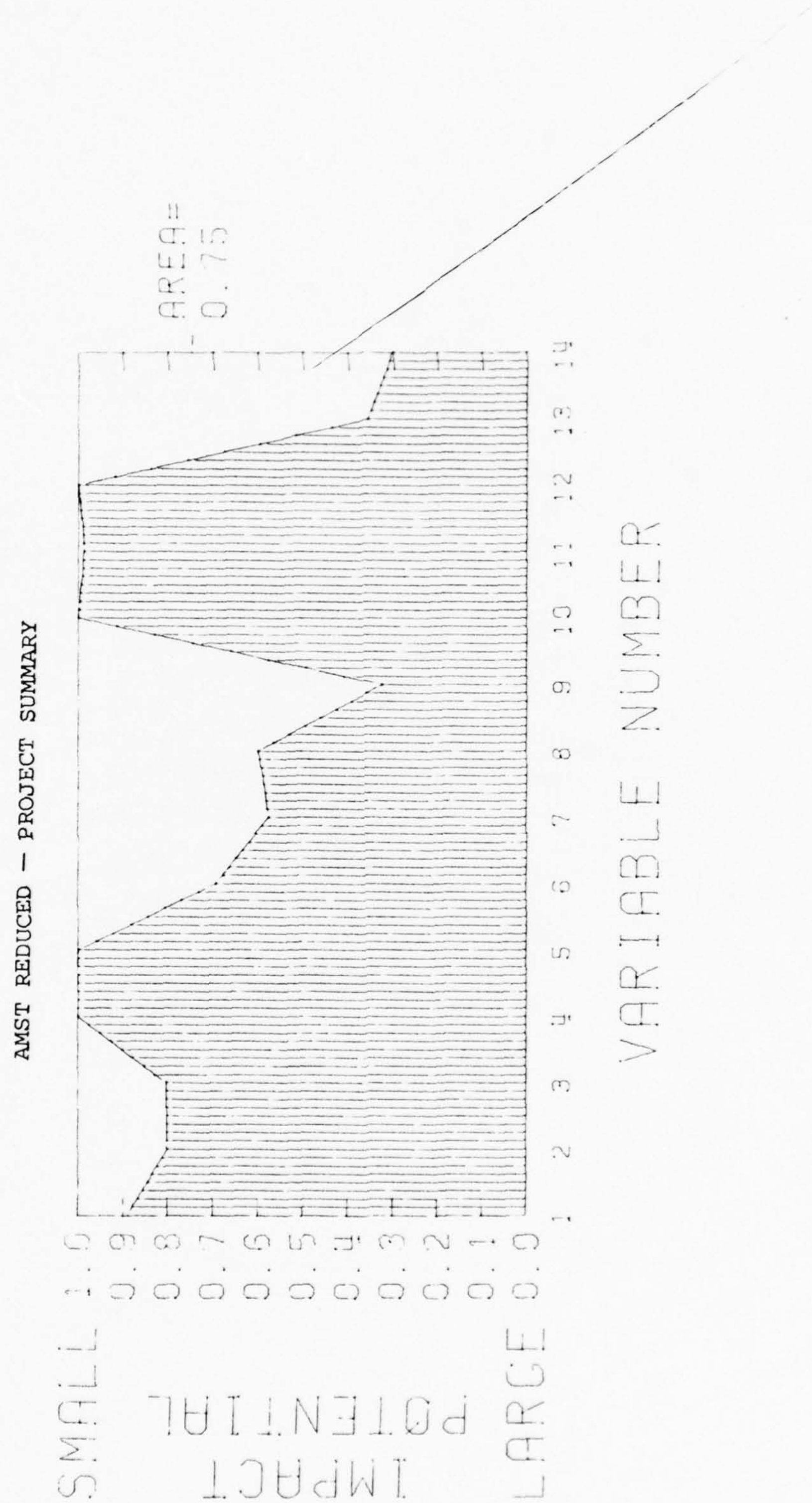
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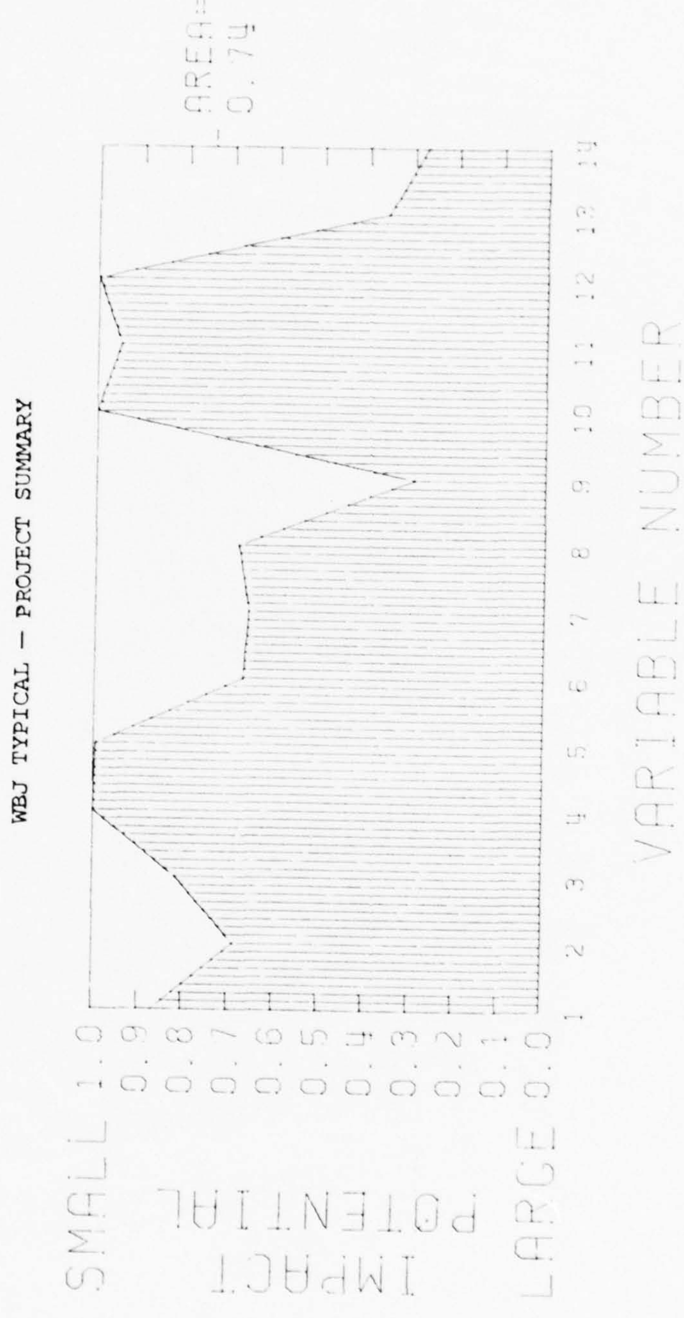
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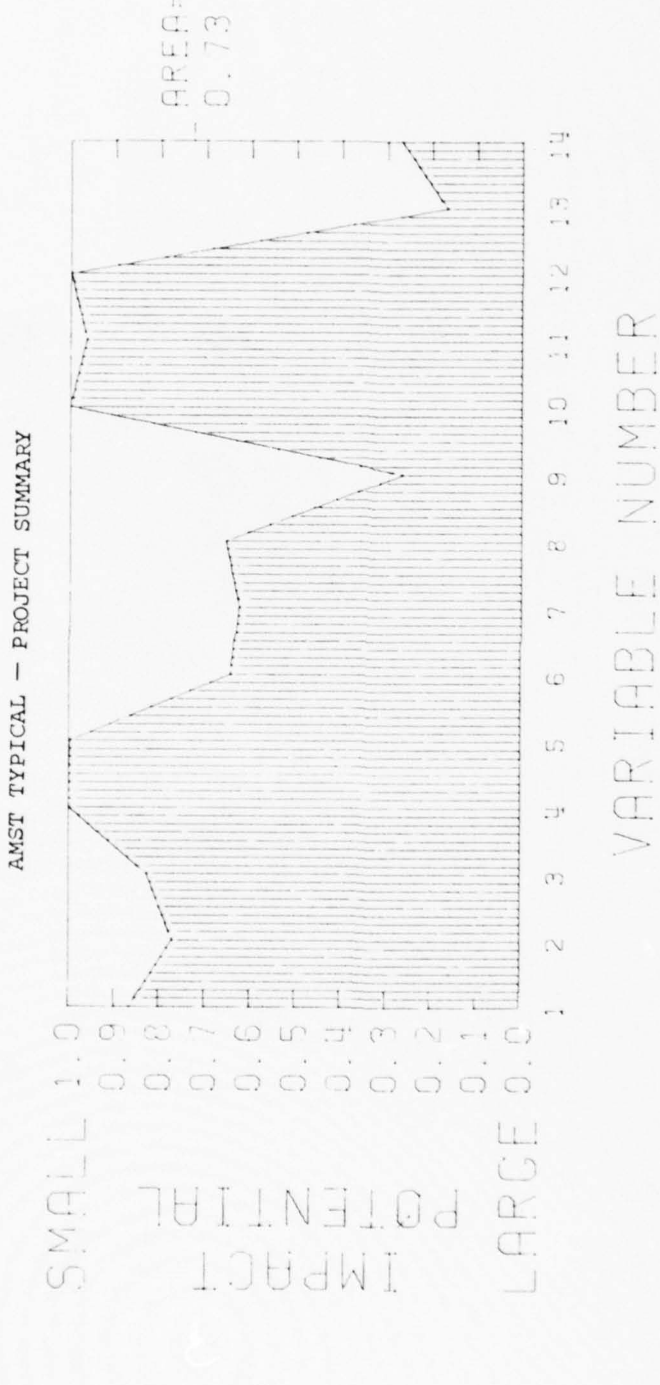
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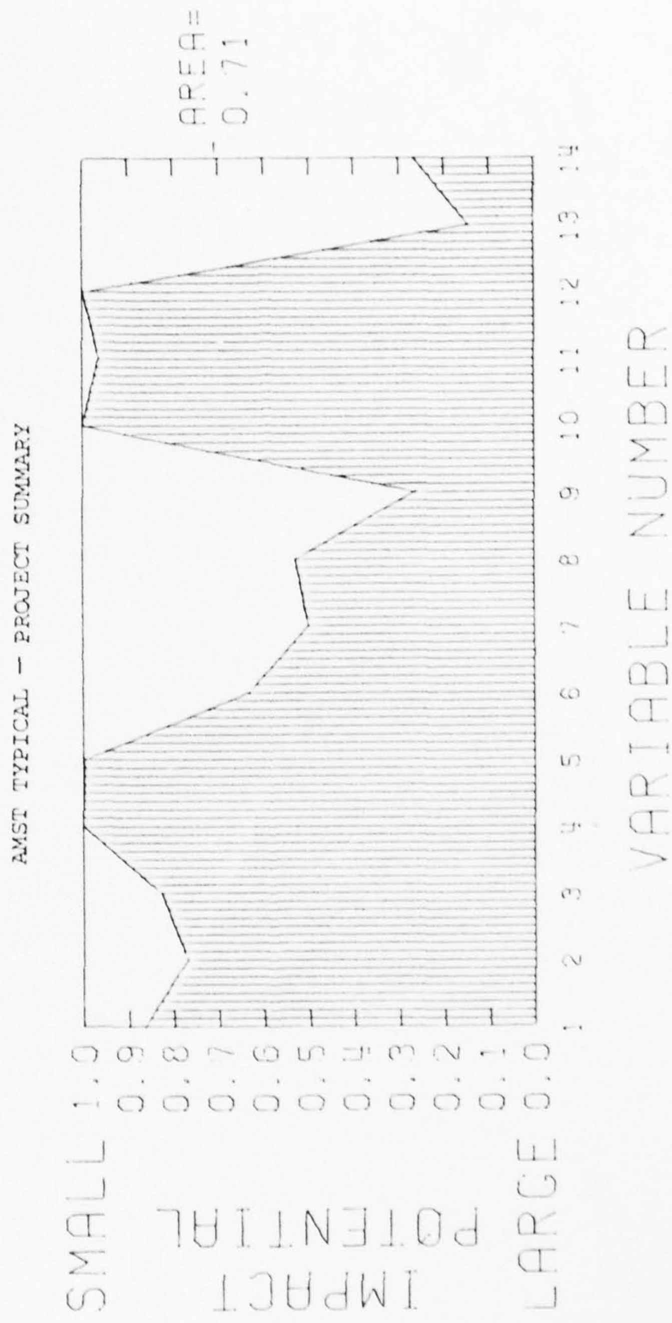
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B

METHODOLOGY FOR EVALUATING PRIMARY ENGINEERING FACTORS

B

METHODOLOGY FOR EVALUATING PRIMARY ENGINEERING FACTORS

A variety of techniques were utilized in an effect to quantify the several primary engineering factors from the data available at this time.

Fenced area is defined as that area excluded from non-military productive use or converted from a pristine state. The area required for a main operating base was derived from a summation of the "footprint" or area required to construct missile, aircraft and operational personnel support facilities, with an allowance for streets and parking areas, and the assumption that 50 percent of the area so derived would be land not now in military use or undisturbed. The resultant area was categorized as "Fenced Area" for the purposes of this analysis. The area required for alert bases was scaled from drawings of prototype bases with base perimeters altered to reflect rectangular parcels.

Direct labor-construction was derived from estimated construction cost by assuming a percentage of construction cost for direct labor which reflected the complexity of the construction and an annual labor rate. Main operating bases with both missile and aircraft facilities were assumed to involve two year construction programs. Bases with aircraft facilities only were assumed to be eighteen month construction programs and bases with alert functions only were assumed to be constructed in one year. It was further assumed that bases which include missile or aircraft maintenance facilities would require sub-system activation personnel and Air Force test and acceptance personnel in numbers equal to 50 percent of the construction contractor work force.

Disturbed area construction and operation were defined as equal to "Fenced Area" on the assumption that all of the additional area required to support the construction of new facilities would be cleared and graded in the course of construction and would be maintained as cleared area for the life of the program.

Water, construction was derived from a summation of the following factors:

- Water used in the concrete mix.
- Water to wash the sand used in the concrete mix.
- Water to wash the aggregate used in the concrete mix.
- Water used to compact fill.
- Water used by construction labor and indirect dependents.
- Water used in dust control.
- Water used in road construction.
- An allowance for miscellaneous water use.

Water, construction and ten years of operation includes the value derived above and the per capita consumption of operating personnel, their dependents and the population influx attributable to the project.

Operating personnel figures used in the analysis were obtained directly from estimates of manpower requirements prepared by Strategic Air Command.

Cement quantities were evaluated from estimates of the "footprint" of the required missile and aircraft facilities and the assumption that these structures would be slab-on-grade, steel frame and metal siding. Concrete to construct floor slabs was estimated and the cement ratio in a conventional mix was used to determine cement requirements.

P.O.L, operations is the summation of POL used in flight operation, POL used in residential heating and POL used in transporation by the population influx attributable to the project.

Frequency of flight operations include all take-offs and landings required for training, crew rotation, supply, aircraft rotation and maintenance as well as command and administrative flights.

Asphalt quantities were derived from an Air Force estimate of surfacing requirements for runways, taxiways and aprons.

C

SPECIAL STUDIES

C

SENSITIVITY TO MITIGATION OF POINT TYPE OF ENVIRONMENTAL CONSTRAINTS

Introduction

Environmental constraints on the Air Mobile Basing Option are often valid for individual locations while being invalid for the entire study region or even relatively small portions of it. The case of endangered species is an example. An area may have a rather dense pattern of favorable habitats which may or may not contain individuals of a protected species. By adjusting the boundaries of prospective bases so that these habitats are avoided it is possible to reduce or eliminate impacts upon the protected species. Careful selection of sites, alignment of runways and placement of access roads can be done to accomplish this goal in some cases.

The degree to which minor adjustments to boundaries, alignments, etc. can be accomplished is a function of two factors. The first is related to the distance between bases and the second to the degree to which an area is free of exclusions. In the former case, centers for possible base development can be plotted using an agreed-upon spacing factor. The total number of potential bases can then be determined. The greater the required spacing the smaller the number of potential bases which can be accommodated a given space and vice-versa. A large spacing factor may also "use up" the limited acceptable space and somewhat increase the probability for adjustments at one potential base causing infringement on the space of a neighboring potential base. The result of this is that actual distances between bases may be somewhat smaller than planned in order to permit base boundary adjustments to achieve environmental mitigation.

In the latter case, the degree to which the area considered for potential base development is free of exclusion areas, determines the flexibility in making adjustments in location or arrangement of a base. A small plot of land may exist in an area with a moderate population density which, while large enough to contain a potential base, is not large enough for alternate scenarios. A minor perturbation to avoid an adverse environmental problem may not be possible without infringement on excluded areas. Thus, an area which appears able to accommodate a potential base may not be a viable candidate as it allows no adjustments for mitigations.

In order to examine this problem in the proper context, a number of exclusion areas were plotted on a map of the central CONUS. Table 1 lists these exclusion classes. Circles were then drawn to determine the number of potential base sites which could be fitted into the existing suitable areas. The circles each have a diameter of 60 nm. The criteria for plotting a circle is that at least 10 percent of the area within the circumference is acceptable according to the exclusion criteria. This supposes that 10 percent would, under normal circumstances, be sufficient to accommodate a potential base. Next, the areas described are ranked according to the percent of the total that is excluded. Table 2 lists the ranking intervals used. The 3 ranks are selected based upon an inspection of the plotted data and appear to be reasonable in this situation.

Table 1. Exclusion classes.

Cities over 25,000 population (radius of 18 nm)
Cities between 5,000-25,000 population (radius of 3 nm)
National Forests and Grasslands
National Parks and Monuments
National Wildlife Refuges
Elevations over 5,000 ft
ICBM Sites
Indian Reservations

Table 2. Percent of exclusion area by rank for potential base sites.

Class	Percent Excluded
1	0 - 10
2	11 - 55
3	> 55

In order to reveal any patterns in the data, areas of similar rank were coalesced into polygons. Figure 1C shows the polygonal pattern which results.

Analysis of the overall pattern in Figure 1C reveals 3 parallel bands which run north and south. Band 1, the most westerly of the three, describes a region with considerable latitude for adjusting proposed bases to mitigate environmental concerns. This band corresponds to the dry western high plains. Population densities are low and the number of urban areas is also. Land values, due to the general lack of water supplies, are somewhat lower than those in the adjoining, more humid, zones. Grazing activities predominate in these regions. This band covers approximately 25 percent of the total acceptable land within the study area.

Band 2, the central one, covers a transition zone between the semi-arid high plains and the humid woodlands to the east. The more abundant water supply, due to increased Gulf influences, provides a major ingredient to agricultural operations. Many large cash grain farms occupy the region, land values are substantial, and population densities are higher than in the western zone. The number, concentration, and diversity of urban centers is greater here too. About 37 percent of the study area is in this class. Flexibility with respect to point mitigations is somewhat lower than in band 1 but is wide enough to permit moderate adjustments or prospective bases.

The third and most easterly band covers much of the humid, midwestern, more urbanized portion of the study area. Abundant water supply plus favorable soils provide an environment that has been considerably developed. Population densities are higher, transportation networks are more dense and the number and diversity of urban centers are the highest found within the area described by the 3 bands. National forests and wildlife refuges, which are most numerous near the Great Lakes, cover large tracts of land. Much of the land is in cash crops and dairying and values are moderate to high. About 38 percent of the study area is within this band. Flexibility with respect to point mitigations is low as space to adjust boundaries and alignments is minimal. The presence of numbers of, or even a single, sensitive environmental factor might prevent a base from being built. As a result such areas must be considered to be only marginally available for base development.

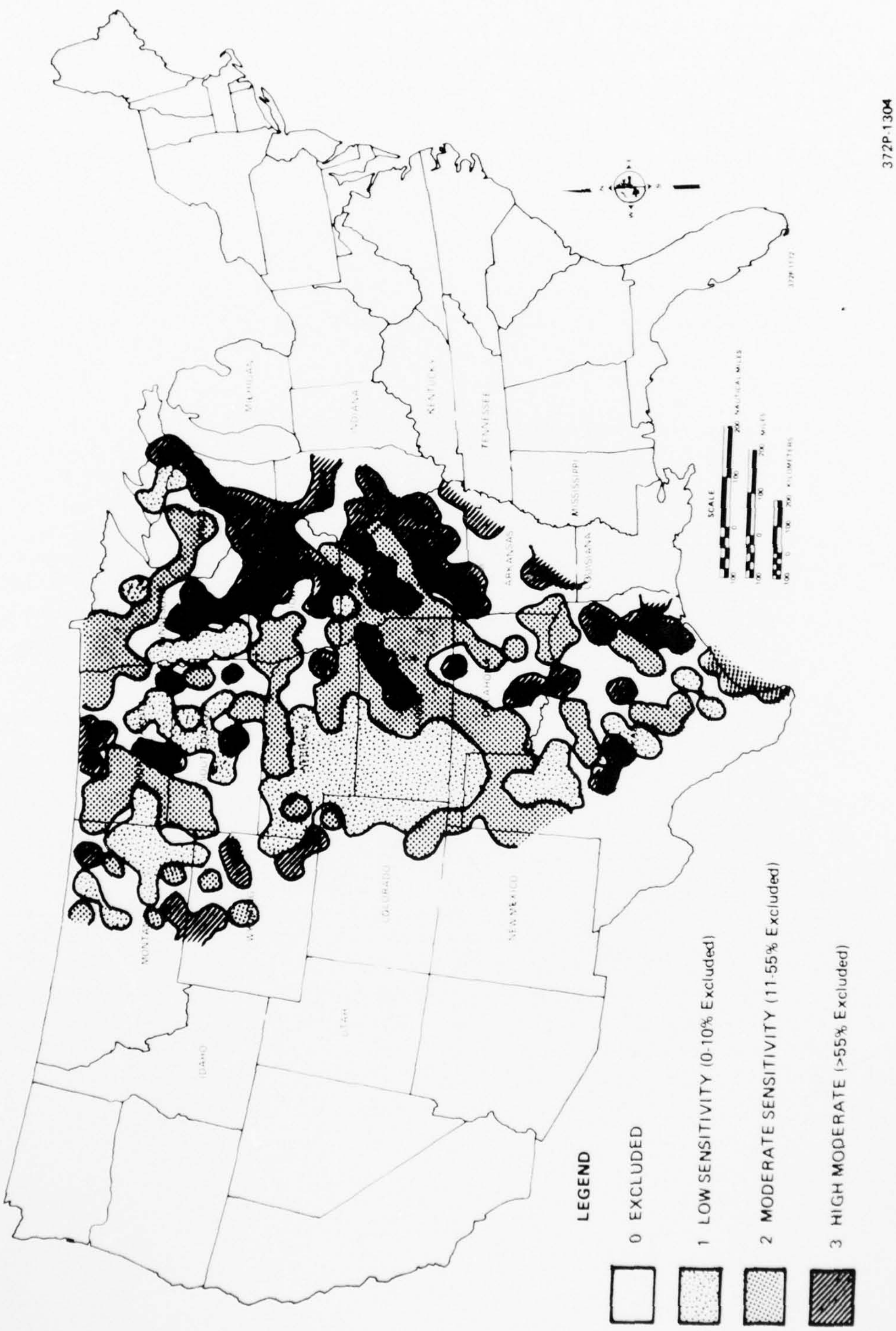

Figure 1C. Sensitivity to mitigation of point type environmental constraints.

Conclusion

Sensitivity to mitigation of point type environmental constraints varies from high in the east, where little room exists for excursions in base location and design, to a moderate sensitivity in the central portion of the study area. The western portion of the region is least sensitive as the natural environment is less developed and adjustments to bases are not a problem.

IIC

IMPACTS OF LOSS OF VEGETATIVE COVER

Loss of vegetation would have direct biological impacts only in the area cleared for the site. Indirect effects, such as displacement of animals and runoff to surface waters, could have much wider ranging effects. The latter, however, is not expected to have significant adverse effects in most, if not all, cases.

Loss of vegetative cover will reduce wildlife habitats for many species, including game species such as deer, quail, and pheasant. In many areas of the central CONUS, suitable wildlife habitat has already been greatly reduced by man. Remaining habitat is often in the form of fence rows, wood lots, and riparian vegetation, and it provides both cover (shelter for breeding and from predators) and food. Loss of even part of these remaining habitats would displace the animals dependent upon them for their survival and could induce a chain reaction which would have local or even regional effects. This has been discussed as the "ripple effect" under impacts to natural areas. These impacts, however, should be minimal in most cases and could be avoided for the most part during siting.

Other indirect effects resulting from increased erosion should be insignificant, particularly in heavy agricultural areas. Furthermore, such impacts could be easily mitigated through standard erosion control measures.

IIIC

IMPACTS TO FEDERALLY PROTECTED SPECIES

Radius of project influence on protected terrestrial species at maximum is the radius around a base subjected to loud aircraft noise. Some species do adjust to this. The radius of influence for aquatic species would be the distance at which adverse degradation on water quality would occur. Endangered species appear to pose little constraints on siting flexibility. The following discussions present the potential impacts and constraints to siting for each species on the federal endangered species list.

The peregrine falcon is not an issue. It could be anywhere, especially along waterways, but no breeding areas or other aggregations are known to occur in the study area.

For the bald eagle, localized winter aggregation areas along waterways, especially reservoirs, should be avoided. A small radius around nesting pairs (tall trees near water in northeast part of area) should also be avoided.

Red-cockaded and ivory-billed woodpeckers are very rare and restricted to senescent pine forest areas in the south. Such areas are unlikely siting areas and could be readily avoided.

Attwater's greater prairie chicken is also very rare. Its range is now restricted to remnants of the Texas native prairie, and some areas of this habitat are protected already. Siting in prevailing habitat types avoids impacts to this and other prairie chickens which are rare and protected by the states in which they occur (since suitable prairie remnants are rare anywhere they occur).

The whooping crane migrates along the Central Flyway (see map). Critical habitat has been designed or is proposed for resting areas along much of the flyway. These and national wildlife refuges along the way are used by cranes and many species of migratory waterfowl (ducks, geese, etc.).

The four species of protected cats are extremely rare and known only in southwetern and southern Texas from where they range into Mexico and farther south. Impacts to this species would be unlikely, but should be considered in siting in the area.

Gray and Indiana bats remain inactive in caves during winter (the Indiana bat has several Missouri cave areas designated as critical habitat), and roost in trees during summer. Feeding (and presumably roosting) occurs in wooded areas along rivers and streams. Habitat loss (unlikely) or increase in amateur spelunking due to regional propulation growth would be the only potentially significant threats. Both can be dealt with during siting studies.

The black-footed ferret is widespread but secretive and probably nowhere common. It is always associated with active prairie dog towns, which provide shelter and prey. In areas where active prairie dog towns exist, siting on one eliminates some potential habitat but the radius of influence is probably very small. Since the species is fossorial (burrowing) and nocturnal, it would probably be relatively insensitive to Air Mobile activities as long as no attempt were made to exterminate the prairie dog.

The only known biologically healthy population of gray wolves in the central CONUS, numbering between 1,000 and 1,200, is in northern Minnesota (see map). Wolves are known from portions of the northern Rocky Mountains, but their population status is unknown. The species exists in northern Mexico, but in presumably low, numbers and occasional individuals have wandered into Trans-Pecos Texas. Critical habitat for the gray wolf has been designated in northern Minnesota. In other states the species should be considered, but is only occasionally or rarely seen. Reduction in suitable habitat is the most likely Air Mobile associated impact.

The red wolf is restricted to an extremely small area of coastal southeastern Texas and adjacent Louisiana. Numbers of wolves are small and hybridization with coyotes is a problem. Problems with MX seem unlikely because the habitat (coastal prairie) and climate-associated problems (hurricanes, flooding) will likely prevent base siting in the area inhabited by the red wolf.

Several protected species of fish and aquatic invertebrates inhabit aquatic habitats in the central CONUS. The species are generally narrow endemics (i.e., restricted to a certain stretch of river; or river drainage or certain spring system), and most are located near the periphery of the study area.

All potential impacts should be avoided through siting and standard mitigative practices to prevent detrimental changes to local water quality/quantity. A hidden but mitigatible potential impact is through increased water use and waste water effluent production at MOBs due to population growth; same story but less important at ABs.

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Potential impacts associated with sedimentation during AB construction is mitigatible through standard practices. It would be no problem in cultivated areas since there is plenty of sediment input from field runoff.

Other impacts would be sewage; use of pesticides/herbicides in non-agricultural areas; and runoff of urea (a nitrogenous fertilizer) used as standard AF practice in place of salt for prevention of icing problems on runways and roads. Again this is probably no problem in agricultural areas because incremental increase in urea runoff is small compared to fertilizer input from farming. Thus, aquatic federally-protected species appear to pose little restriction to siting.

IVC

IMPACTS TO NATURAL AREAS

The radius of direct project influence on natural areas would be the size of area distributed plus the visible and/or noise intrusion on wildlife and solitude values which would cover a somewhat larger area. The extent of project influence is difficult to estimate since it depends upon the ultimate project design and the sensitivity to the project of the organisms present in each natural area.

Natural areas (pristine or relative undisturbed areas) have a high biological as well as aesthetic value. They provide places for scientific study of animals and plants in a "natural" environment; habitat for species which may be unable to adapt to conditions in areas substantially altered by man; and areas of aesthetic beauty and solitude where human influence is minimal.

These areas include national wildlife refuges, national landmarks, parts of national forests, critical habitats for endangered species, and aquatic areas utilized by migratory waterfowl.

Local influences would result primarily from removal of habitat and effects of noise. The latter is discussed as a separate key variable. Long range and indirect influences could result from the displacement of animals from their present habitat. This could cause a chain reaction producing local to regional "ripple effects".

This "ripple effect" may range from a minimal effect in which all displaced individuals can find new feeding and breeding areas without displacing individuals in other areas, to a maximal effect in which all suitable environments are saturated with the species (or there is no other suitable habitat within the traveling range of the species) resulting in elimination of the displaced individuals from the population. Thus, the worst case would be elimination of all individuals of a species that were within the sphere of project influence. With most species the probable effects would be toward the minimal impact case.

VC

IMPACTS OF AIRCRAFT-ASSOCIATED NOISE ON ANIMALS IN THE CENTRAL CONUS

The radius of project-related sound influence, primarily from RAT aircraft, on terrestrial animals is estimated to be the 100 dB contour. The distance of this contour, however, will depend upon the project variables such as type of aircraft utilized. The rationale for the choice of this sound level is discussed in the following paragraphs.

The effects of aircraft noise on animals is difficult to assess but available data suggest that such effects are minimal. Most recent studies have concentrated on the effects of sonic booms on wild and domestic animals (Fletcher and Busnell, 1978). Studies of aircraft noise due to normal operations have concentrated on people (EPA, 1971; Conner and Patterson, 1976). As a result there is very good data on the characteristic noise "footprints" of various aircraft and of airports and an associated literature on the responses of people to those footprints and to frequency of noise episodes.

Domestic sheep exposed to different kinds and intensities of sound showed alterations in certain physiological parameters which demonstrated adaptation to noise, but at a level different from initial values (Ames, 1978). Heart and respiratory rates increased with sound intensity (75 vs 100 dB) as well as kind of noise (music vs white noise) (Ames, 1978). Overall, sheep under the conditions of Ames' (1978) experiments showed no deleterious physiological responses to noise.

Wild turkeys exposed to simulated sonic booms with overpressures less than one psf were not negatively affected with respect to brooding or rearing of young (Lynch and Speake, 1975, 1978). Cottereau (1978) summarized studies of the effects of sonic booms on domestic and wild animals. Only horses and dogs have shown significant fright behavior. Wild animals did not seem to be unduly affected. Another study has failed to show significant effects of aircraft overflights on seabirds (Dummet, 1977). However, nesting failure of a colony of terns in Florida has been blamed on jet aircraft overflights (Henkin, 1969; Bell, 1970). Pelican nest predation by gulls has been observed when the pelicans left the nest in response to sonic booms (Graham, 1969).

Probably the most serious result of chronic noise exposure for wildlife is interference with intra- or interspecific auditory signaling. A variety of animals depend upon sound for communication, and predator-avoidance of hunting, and high-intensity noise in the environment could

effectively jam their signaling or signal-sensing systems (EPA, 1971). Very little research has been done in that area and nothing is known of the population effects of chronic or short-term high intensity noise on wildlife. Intermittent, regular or irregular, noise such as would likely occur at an austere base would probably have minimal effects. Frequent high intensity noise, such as at commercial airfields or regular military air bases, would be more likely to have a long-term influence on exposed wildlife populations.

Noise with intensities up to about 60 dB seem to have little effect on wildlife, particularly if the animal only encounters the sound intermittently (Lee and Griffith, 1978). Sounds of up to ca. 100 dB will elicit startle responses in some cases, but seem to have no lasting effects on domestic or wild animals (U.S. EPA, 1971). Sound intensities in excess of 100 dB can begin to cause organic damage in some species, especially with chronic exposure (U.S. EPA, 1971). It seems reasonable that the 100 dB noise contour around an airfield would represent a reasonable radius of noise effect for most species. More mobile and sound sensitive species might well remove themselves farther. Small, locally territorial species can probably adapt to the noise, even near the edge of a runway. Reports from the USSR indicate that owls who hunt by listening for prey often hunt along aircraft runways and in city parks (Anisimov and Ilicher, 1975), and starlings and rabbits are a common nuisance species around certain airfields.

The evidence currently available suggests that few, if any, wild or domestic species in the central CONUS region will be unduly negatively affected by the aircraft noise levels or frequency likely to be associated with austere bases operation. Increases in noise levels at existing air bases probably will not unduly influence wildlife or domestic stock either, given a moderate increase. Large increases in noise intensity or number of episodes might have negative effects, but present data do not allow for an a priori assessment.

D

RARE AND ENDANGERED SPECIES

D

RARE AND ENDANGERED SPECIES

Sensitive Biota in the North and South Central CONUS

Nine animal species and one plant species in the north central CONUS study region are protected as threatened or endangered species under the Endangered Species Act of 1973 (Table A-1). Twenty-nine animals and one plant are federally listed in the South Central CONUS. In addition, two butterflies occurring in the North Central CONUS are proposed as endangered or threatened species and numerous plant species occurring mostly in the eastern and western peripheries of the region were proposed as endangered in 1976 but are still pending final rule-making. Figure A-1 shows the distribution of the two federally protected plant species occurring in the entire central CONUS study region.

An additional 18 mammals, 46 birds, 25 reptiles, 6 amphibians, 56 fish, 3 insects and 1 mollusc occurring within the north-central CONUS are protected by state laws as threatened, endangered or rare species. Their frequency distribution by state is shown in Table A-2.

With the notable exceptions of species having broad diffuse ranges (e.g., bald eagle, peregrine falcon, swift fox), these species tend to be restricted in range. The majority of these protected species are restricted to a single state and only birds and fishes have a significant number of rare species that occur in more than two states. Figure 1.3.2-2 in Section 1.3.2 shows the distribution by county of federally protected aquatic species in the central CONUS and further illustrates the restricted distributions of many of these species (the Higgins eye pearly mussel whose distribution along the Mississippi appears extensive, is known from only three localities along that range).

Critical habitats have been designated for five species in the central CONUS (Figure 1.3.2-1) and listings are pending for critical habitat for six additional species and for additions to the critical habitat of the endangered whooping crane. These critical habitats represent wintering areas in the south and important feeding and resting areas along its migratory route.

Table A-1. Threatened or Endangered Species, North Central CONUS.

SPECIES	MT	WY	CO	ND	SD	NE	KS	MN	IA	WI	IL	MI
Mammals												
Black-footed ferret (*Mustela nigripes*)	E	E		E	E	E	E					
Gray wolf (*Canis lupus*)	E		E	E				T		E		E
Indiana bat (*Myotis sodalis*)											E	
Northern swift fox (*Vulpes velox hebes*)				E	E	E						
Birds												
Bald eagle (*Haliaeetus leucocephalus*)		E		E	E		E	T		T	E	T
Peregrine falcon (*Falco peregrinus*)	E	E	E	E	E	E	E		E	E	E	E
Whooping crane (*Grus americanus*)	E	E	E	E	E	E	E					
Eskimo curlew (*Numenius borealis*)					E	E	E				E	
Invertebrates												
Higgins eye pearly mussel (*Lampsilis higginsi*)								E		E		
Plants												
Northern Wild Monkshood (*Aconitum novaboracense*)									T	T		
PROPOSED:												
Dakota skipper butterfly (*Hesperia dakotae*)				P				P				
Karner blue butterfly (*Lycaeides melissa samuelis*)								P		P		

E = Endangered Species
T = Threatened Species
P = Proposed endangered or threatened

Table A-2. Frequency distribution by state of federally and state-protected species in the North-Central CONUS study region.

	Number of States	Number of Species
Mammals - (18)	1 - 8	7 - 0
	2 - 7	8 - 0
	3 - 2	9 - 0
	4 - 0	10 - 0
	5 - 1	11 - 0
	6 - 0	12 - 0
Birds - (46)	1 - 28	7 - 0
	2 - 9	8 - 0
	3 - 2	9 - 0
	4 - 3	10 - 0
	5 - 3	11 - 0
	6 - 1	12 - 0
Reptiles - (25)	1 - 16	7 - 0
	2 - 9	8 - 0
	3 - 0	9 - 0
	4 - 0	10 - 0
	5 - 0	11 - 0
	6 - 0	12 - 0
Amphibians - (6)	1 - 6	
Fish - (56)	1 - 34	
	2 - 12	
	3 - 6	
	4 - 3	
	5 - 1	
	6 - 0	
Insects - (3)	1 - 3	
Molluscs - (1)	1 - 1	

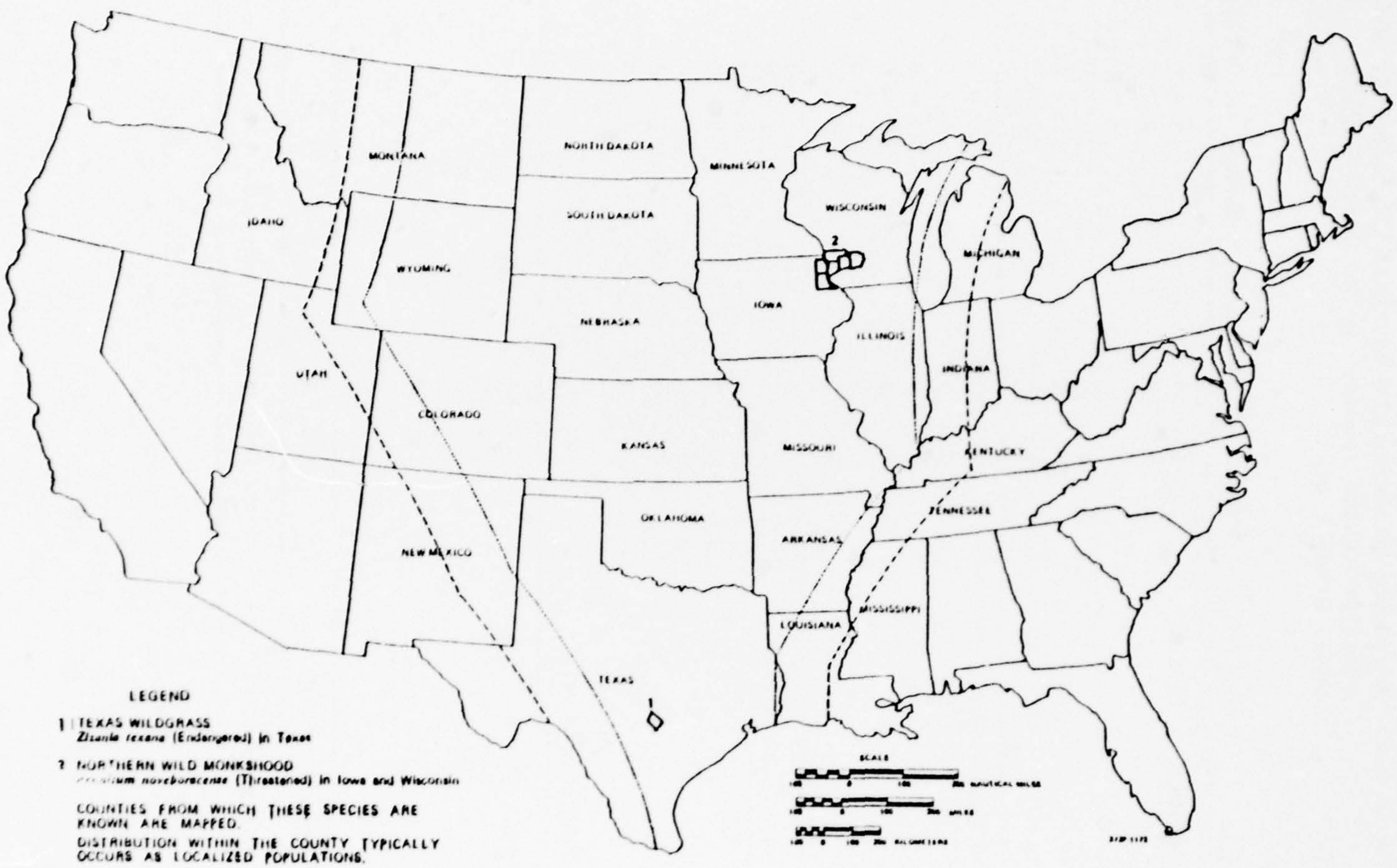

Figure A-1. Federally protected plants.

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F

GLOSSARY AND ACRONYMS

F

GLOSSARY AND ACRONYMS

Air Mobile Defense System	One which uses air mobility to provide a basing mode for MX.
Alert Base "austere base"	A base in a ready posture with the minimum necessary facilities and few or not permanently assigned personnel bases are sited to provide adequate escape time from a surprise attack.
C3 Network	A command, control, and communications network.
Dispersal Strips	Unmanned airstrips which use any appropriate existing surface that is adaptable for landing under emergency conditions.
Excursion	A variation in the project configuration or location.
Main Operating Base	A base containing all the facilities necessary for the support of the alert base.
"Naturalness" Value	The value of an untouched area in which plants and animals may be observed and studied. Because the area acts as a control situation, the data obtained can be used for making value judgments concerning the impacts of human intervention on the natural habitat of an area.
Paleo Indian	Refers to ancient American Indian culture.

TRIAD	A defense system which has three types of offensive components, each with its own strengths and weaknesses, so that no single enemy threat can destroy the system.

ACRONYMS	F2
AFFTC	Air Force Flight Test Center, Edwards AFB, CA.
AMST	Advanced Medium Short Takeoff and Landing Transport aircraft.
CONUS	Continental United States.
DEIS	Draft Environmental Impact Statement
GBS	Ground Beacon System
GPS	Global Positioning System
MED	Minimum Engineering Development
MOB	Main Operating Base
MPS	Multiple Protective Structure system (a class of survivable ICBM deployment systems)
NMCS	National Military Command System
POL	Petroleum, oil, lubricants
SLBM	Submarine Launched Ballistic Missile
SPO	System Program Office
TSP	Total suspended particulates
WBJ	Wide-bodied jet aircraft

G

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